Z
7913
U5B

BIBLIOGRAPHY of Technical Reports

November 18, 1951
Vol. 16, No. 5

Contents

Controlling the Technical Report.....141
Chemicals and Allied Products.....143
Drugs and Pharmaceuticals.....143
Plastics and Plasticizers.....143
Miscellaneous Chemicals.....144
Deterioration Studies.....145
Electrical Machinery.....145
Communication Equipment.....145
Electronics.....145
Miscellaneous.....147
Food and Kindred Products.....147
Fuels and Lubricants.....147
Instruments.....148
Leather and Leather Products.....149
Machinery.....149
Medical Research and Practice.....151
Metals and Metal Products.....153
Meteorology and Climatology.....159
Minerals and Mineral Products.....159
Ordnance and Accessories.....163
Personnel Aptitude Testing.....163
Photographic and Optical Goods.....164
Physics.....164
General.....164
Nuclear.....165
Structural Engineering.....166
Textiles and Textile Products.....167
Transportation Equipment.....167
Aeronautics.....167
Aircraft.....167
Instruments.....171
Engines and Propellers.....173
Training and Training Devices.....173
Aerodynamics.....174
Land Transportation.....176
Marine Transportation.....176
Miscellaneous.....177

NEWSLETTER IN CENTER FOLD

U. S. DEPARTMENT OF COMMERCE
OFFICE OF TECHNICAL SERVICES

NOTE: The Office of Technical Services is responsible, under Presidential order, for aiding in the adequate dissemination of technical reports of benefit to American science and industry. Except to the extent indicated by acknowledgement of authorship, the Office does not edit reports, nor does it accept responsibility for information and opinions contained in them. Patents may cover the subject matter of any report—the reader is advised to make suitable patent searches before developing applications based on the reports.

PROCEDURE FOR ORDERING REPORTS

1. Order by PB report number.
2. Orders for reports in microfilm or photostat type of reproduction listed in the Bibliography of Technical Reports should be addressed to the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C. Check or money order accompanying orders for microfilm or photostat reports should be made payable to the Librarian of Congress.
3. Orders for reports available in printed form should be addressed to the Department of Commerce, Office of Technical Services, Washington 25, D. C. Check or money order accompanying order for printed reports should be made payable to the Treasurer of the United States.
4. Foreign purchasers of reports, other than Canada and Mexico, should include an additional amount for postage according to the following scale:
   A. Printed reports, mimeograph reports, and photostats: Approximately 4 pages per ounce.
   B. Microfilm: Approximately 50 frames per ounce.

   Rates will vary for different countries. It will be the purchaser's responsibility to compute postage from his country.

This publication is issued by the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C., on a subscription basis, $5 for 1 year. Foreign subscribers are requested to remit $3 additional for postage. Subscription price of the Newsletter is $0.50 per year.

Published with the approval of the Director of the Bureau of the Budget

---

The reports listed have been received from civil and military agencies of the United States Government and from cooperating foreign governments. Many of the reports cover information captured in enemy countries. Secrecy restrictions on all reports listed have been lifted.

UNITED STATES DEPARTMENT OF COMMERCE

Charles Sawyer, Secretary

OFFICE OF TECHNICAL SERVICES

John C. Green, Director

U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

BIBLIOGRAPHY OF

Technical Reports

November 1951

CONTROLLING THE TECHNICAL REPORT*

One of the more interesting developments of recent years in the field of scientific literature has been the rapid rise in importance of the technical report - a form of publication which is characterized principally by its heterogeneity of style, professional stature, size and form of reproduction and by the absence of anything like volume and number relationships. Considered very briefly in the following paragraphs are the background of this development and one or two of the problems raised by it.

Prior to World War II, technical information developed in a scientific research program invariably became formally available to the ultimate consumer packaged in one or both of two forms - journal articles and books. This was true regardless of whether the research was done in a university, an industrial, or a government laboratory. Papers disclosing research results were published in many kinds of journals all of which were standardized at least to the extent that they appeared with reasonable regularity in issues for which specific volume, number and page references could be given. For such publications there is, of course, a broad assortment of abstracting services which announce the existence of published research articles and summarize their contents. Access to a paper listed by one of these services can be obtained by purchase of a copy, photostat or microfilm; by visiting or borrowing from a library; or by button-holing the author at the next professional society meeting and asking for a reprint.

The other major pre-war form of publication of research results - books - lag journal articles considerably. (It used to be claimed that 10 to 15 years were required for a new scientific fact to find its way into a textbook). Here also, however, bibliographic procedures for making the public aware of the existence of technical books and of the nature of their contents are well organized. As a whole, then, in the period prior to World War II, a state of reasonably stable equilibrium had been achieved in the technical information field with most of the variables being under fair control.

With World War II there came the situation in which the government poured immense sums of money into scientific research - both in increased appropriations to existing government laboratories and in support of the extensive program of the Office of Scientific Research and Development under which defense-related research contracts were written with numerous universities and industrial firms. This contract type of research and development operation has been continued since the war under the direct administration of various government agencies concerned with national defense. The over-all effect of this rapid expansion of research on the dissemination of technical information among scientists and engineers has been nothing short of catastrophic - a fact well known, I am sure, to most subscribers to the BIBLIOGRAPHY OF TECHNICAL REPORTS.

One important phase of the total effect has been the meteoric growth in significance of a third way of packaging scientific information - the technical report. Of the specific factors which have contributed to giving this form of publication a major role on the post-war technical information state, three are outstanding. First is the fact that so much defense-related research was, and continues to be, under military security restrictions. This means that conventional journals automatically are ruled out as media of publication for a considerable fraction of the research results. Further, this situation tends even to limit severly the field of possible usefulness of classified journals because security clearances ordinarily involve two criteria - security classification and "need to know". Thus, any proposed recipient of, for example, a SECRET journal would have to possess both a SECRET clearance and a need-to-know interest in that journal's entire contents. Consequently, the tendency has been to treat each classified paper as a separate document rather than to group them into issues of classified journals. A second important factor stems from the stewardship relationship between the contractor and the contracting agency. The former accepts funds in return for which he contracts to perform

*Condensed from a paper presented 12 May 1951 at the U. S. Naval Post Graduate School before the National Capital Area Section of the American Society for Engineering Education.

certain assignments for the latter. The contracting agency has the right - indeed, the responsibility - to keep itself informed at all times as to how the funds are being expended and what progress is being made on the assigned tasks. Consequently, research and development contracts invariably include requirements of some kind regarding the submission of reports. It seems clear that, quite aside from the security problem, conventional journal publication could not satisfy this obligation. Then third there is the importance of making scientific information for which the government has paid one contractor available promptly to other similarly-sponsored research groups who might use it profitably in avoiding duplication of effort, in speeding up their own programs and, therefore, in bringing the maximum return per taxpayer's dollar expended in defense-related research. Again, the regular journal outlets are not in a position adequately to meet this need.

Because of these and other factors, the non-serial technical report has attained a position of considerable eminence in the current technical information field, with some 150,000 or more such documents being issued annually by the laboratories and contractors of the various government agencies concerned with research related to national defense. One of the major problems accompanying this deluge of report-packaged technical information has been how to control it bibliographically - where such control may be thought of basically simply as systematic means for letting scientists and engineers know (a) what material there is, (b) whether they want it and (c) how they can get it.

Reference already has been made to the bibliographic controls that apply to conventionally-published technical information. Analogous machinery has had to be developed for the report literature. The early stages of the evolution were largely intra-laboratory in nature with each such organization, first, designating some unit of the laboratory as custodian of reports; second, establishing a cataloging and indexing system; third, getting itself on as many report distribution lists of other laboratories as possible; and finally, adding such services as periodic announcement lists, abstract bulletins, reference and bibliography service, and so forth.

Single-agency documentation centers of this kind are essential because they can process reports very promptly and can vary their services to fit the peculiar needs of their respective establishments. Adequate inter-laboratory correlation of reports activities, however, requires that these separate centers supplement and be supplemented by more elaborate documentation agencies with broader bibliographic responsibilities. Consequently, centralized agencies for handling and controlling technical reports have come into being. At present, five organizations control bibliographically the great bulk of the technical report literature originating in defense-related research programs. Four of these serve only government agencies and their contractors and deal with technical information in all classification categories. They are the Technical Information Service of the Atomic Energy Commission, the Division of Research Information of the National Advisory Committee for Aeronautics and, within the Department of Defense, the Central Air Documents Office and the Navy Research Section of the Library of Congress. As soon as a directive recently signed by the Secretary of Defense is fully implemented, the activities of the last two of these probably will be integrated under a single Armed Services Technical Information Agency. The fifth of the major documentation centers is the Office of Technical Services of the Department of Commerce, the agency which publishes the periodical in which this article appears. Its mission is to make the unclassified results of government-supported research available to the people who really pay the bills - the taxpayers. In other words, American industries and laboratories that do not have defense-related contracts, and therefore are not eligible to use the services of the first four documentation centers, do have access through this fifth one to a large fraction of the unclassified data and results coming out of these research and development programs.

Thus, even though the technical report relatively is a very youthful member of the technical publication family, considerable machinery for its bibliographic control already has been developed. This evolutionary process is continuing with particular emphasis on improvement of service and reduction of duplication among the major documentation centers. An example of the latter kind of advance is the recent agreement of the card-issuing agencies in the group mentioned above upon a common catalog card and abstract journal format and, to a considerable extent, upon a common subject heading list. Eventually it may be hoped that procedures for controlling technical reports and making them available to scientists and engineers will attain a degree of efficiency and integration equal to or greater than that which long has existed for the older forms of scientific literature.

Dwight E. Gray
Chief, Navy Research Section
Library of Congress

CHEMICAL AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

INTRAVENOUS PROCAINE, AN EXPERIMENTAL STUDY. "PHARMACOLOGICAL STUDY OF INTRAVENOUS PROCAINE", by H. R. Hulpieu and Versa V. Cole. Indiana. University. School of Medicine. Dept. of Biochemistry and Pharmacology. Mar 1949. 89p graphs, tables Mi $3.75, Ph $11.25. PB 105019

1. Novocaine - Intravenous administration 2. Anesthesia - Physiological effects.

Contract N6ori-180, Task order II, NR 121-158, Final report.

MICRO-DETERMINATION OF CHLOROPICRIN, by Leo Feinsilver and Fred W. Oberst. U. S. Chemical Corps. Medical Laboratories, Army Chemical Center, Md. Jun 1951. 12p graph, tables Mi $1.75, Ph $2.50. PB 104626

1. Chloropicrin - Determination 2. CC MD RR 62.

CMLEM-52. Project no.: 4-08-02-007. Test program no.: T20.

Plastics and Plasticizers

INJECTION MOLDING OF L-5 CERAMICS, by R. E. Stark. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Apr 1947. 38p photos, drawings, tables Mi $2.25, Ph $5.00. PB 104097

This report covers the following subject: a. Flow pressures for various binders using three orifice sizes. b. Effect of temperature on flow pressure using a constant orifice diameter. c. Design of flow pressure die and parts. 4. Injection of 3/4" x 3/4" cylinders and effect of temperature, binder content, clay content, and binder "blends" on same. For reports no. 1, 4-6, 9-10 on this contract see PB 104096, 104098-104102. SIG Contract W-36-039-sc-32376, Report no. 3.

INJECTION MOLDING OF L-5 CERAMICS, by R. E. Stark. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Jul 1947. 28p drawings, tables Mi $2.00, Ph $3.75. PB 104098

Continuation of "injection of 3/4 x 3/4 slugs" will be considered first. This phase is followed by various changes in procedure, die design, gate design, and plasticizer types. For reports no. 1, 3, 5-6, 9-10 on this contract see PB 104096-104097, 104099-104102. SIG Contract W36-039-sc-32376, Report no. 4.

INJECTION MOLDING OF L-5 CERAMICS, by R. E. Stark. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Oct 1947. 47p drawings Mi $2.50, Ph $6.25. PB 104099

It covers results on injection of 3/4" x 3/4" cylinders, but using bodies 7069 - 7098 inclusive. These bodies contain the following plasticizers: Product 2310 wax, petrosene C wax, asphalt F-1, asphalt G-3, shellac, benzine, paraffin wax, petrolatum wax, ozokerite wax, montan wax, cetyl alcohol, carbowax 1500, carbowax 4000, stearic acid, pine oil, pine tar, glycerine, vinylite, pine tar syrup, gilsonite and light coal tar. Various spruce designs were used, such as, 1/8" orifice, 3/16" tapered sprue, fan gate, ring gate and multiple orifice sprue. A 1-3/4" disc cavity was also used. Attempts were made to mold a 5" diameter disc specimen as required by JAN-I-10. The results and problems encountered are described. Proposed changes or remedial measures are also outlined. A porous die cavity is described and the results using same are described. For reports no. 1, 3-4, 6, 9-10 on this contract see PB 104096-104098, 104100-104102. SIG Contract W36-039-sc-32376, Report no. 5.

INJECTION MOLDING OF L-5 CERAMICS, by R. E. Stark. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Jan 1948. 52p fold drawings, table Mi $2.75, Ph $7.50. PB 104100

This report covers a few additional results by the old method, a description of the new press (Watson Stillman 4E100 press), and results obtained with a 5" diameter disc die constructed for use with the 4E100 press. For reports no. 1, 3-5, 9-10 on this contract see PB 104096-104099, 104101-104102. SIG Contract W36-039-sc-32376, Report no. 6.

INJECTION MOLDING OF L-5 CERAMICS, by R. E. Stark. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Oct 1948. 28p Mi $2.00, Ph $3.75. PB 104101

Results on injection of these materials are included Experiments on the improvement of the mixing method were begun. A revised baking operation was investigated. Some repair work to both press and die was required. This work is described along with causes for the breakage. Best results were realized with materials 7472 and 7102. The latter material contains a zircon porcelain base and presents an added field for investigation. A comparison was made among steatite, zircon, and alumina base bodies. It was concluded that continued efforts must be directed toward obtaining maximum plasticity with minimum binder content. For reports no. 1,3-6, 10 on this contract see PB 104096-104100, 104102. SIG Contract W36-039-sc-32376, Report no. 9.

INJECTION MOLDING OF L-5 CERAMICS, by R. E. Stark. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Jan 1949. 31p drawing Mi $2.25, Ph $5.00. PB 104102

During the period experiments with Cliderite materials were completed. The use of a torpedo in the heating cylinder was studied with one type of molding material. Preparation of molding material by the "slip method" was begun. A study of calcined steatite material was initiated. Injection into plaster cavities was revived, and experiments were conducted in the 4E100 press. Descriptions of the fabrication of molds, preparation of materials, injection procedures, and observations on injected specimens are also included. A projected work outline for the next period was set forth. Dept. of the Army project: 3-99-15-022. Signal Corps project: 152B. For reports no. 1, 3-6, 9 on this contract see PB 104096-104101. SIG Contract W36-039-sc-32376, Report no. 10.

LOW LOSS HEAT RESISTING MOLDING COMPOUNDS QUARTERLY DEVELOPMENT REPORT NO. 1, QUARTER ENDING FEB 1949, ON CONTRACT W-36-039-SC-38191, PREPARED by W. R. Graner. Federal Telecommunication Laboratories, Inc., Nutley, N. J. Feb 1949. 22p photo, graphs, tables (1 fold) Mi $2.00, Ph $3.75. PB 104071

The physical and electrical properties of FTL 137-67-1 and the Dow Corning Fiberglas Molding Compound have been reevaluated in conformance with tentative specifications. The flexural strength, dissipation factor (60 cy), and dielectric constant (60 cy) of both materials deteriorate at elevated temperatures. Impact strength is not affected by low temperatures (-55°C). Army project no. 3-39-00-000. Signal Corps project no. 32-2005-33.

LOW LOSS HEAT RESISTING MOLDING COMPOUNDS. QUARTERLY DEVELOPMENT REPORT NO. 4, FOR QUARTER ENDING NOVEMBER 1949 ON CONTRACT W36-039-SC-38191, by F. A. Muller and S. Kaganoff. Federal Telecommunication Laboratories, Inc., Nutley, N. J. Dec 1949. 38p tables Mi $2.25, Ph $5.00. PB 104381

Progress is reported on the development of low-loss heat resisting molding compounds. Experiments which were started in the last quarter, such as transfer molding and the development of molding materials, were completed and the results are outlined. A survey of the literature on silicones was made and original Russian literature was reviewed. Information concerning the factors affecting the properties of polysiloxanes is presented. Previous studies on low-loss thermosetting molding compounds were extended to include synthesis of organosilicone compounds and their application in modifying synthetic resin condensates. File no. 3112-Ph-49-S-(3124). Department of the Army Project no. 3-39-00-000. Signal Corps Project no. 32-2005-33. Case 9-17-63, Chemical and Physical Laboratories.

Miscellaneous Chemicals

CHROMATOGRAPHIC STUDIES. ANNUAL TECHNICAL REPORT ON NAVY RESEARCH PROJECT 4, TASK ORDER 4, CONTRACT N7 ONR-356, by Arthur L. LeRosen. Louisiana State University, Baton Rouge, La. Jan 1949. 35p tables Mi $2.25, Ph $5.00. PB 105021

When a mixture of substances in solution is poured on a column of adsorbent packed in a glass tube, and this is followed by washing the substances through the column by a solvent, in favorable cases the substances will separate into zones. The object of this study was to discover some of the reasons affecting the specificity of adsorbents for certain types of substances. The work is divided into three main parts: the characterization of the adsorbents at hand, the development of methods for detecting zones of colorless substances on the columns, and the specificity studies on some common adsorbents.

COMPARATIVE STUDIES OF GALLIUM CHEMISTRY. BIMONTHLY REPORT NO. 12, APR 1-JUNE 1, 1949. Illinois. University, Urbana, Ill. Jun 1949. 10p graphs, tables Mi $1.25, Ph $1.25. PB 105015

The hydrolysis studies outlined in previous reports have been made on solutions of gallium tribromide. Using calculations based on the assumptions previously outlined, an average hydrolysis constant of 4.0×10^{-4} was obtained over the concentration range 0.010 to 0.400 molar gallium ion. Electrometric titrations with standard alkali were carried out on solutions of gallium tribromide and thallium trichloride. For the gallium tribromide solutions precipitation incidence of the hydrous oxide was noted at a mole ratio of added hydroxyl ion to gallium ion approximating 3.0 and at about a pH of 5.0. From thallium trichloride solutions thallium (III) oxide was precipitated at an average pH of 3.28 and at a mole ratio of about 0.65. Also during this time some preliminary experiments on the polarography of the tripositive gallium ion have been carried out with the hope that ultimately this method might give some insight into the nature of the species existing in a solution of some gallium salt to which an insufficient quantity of hydroxyl ion to precipitate the hydrous oxide has been added. The high temperature reactions between gallium oxide and other more basic oxides have been continued. Magnesium gallate has definitely been obtained by heating a mole-to-mole mixture of magnesium oxide and gallium oxide for 5 1/2 hours at 1300°C. Contract N6ori-71, Chemistry task XVII.

GERMAN HEAVY CHEMICAL INDUSTRY, by Divan Nanak Chand. British Intelligence Objectives Sub-Committee. Sep 1946. 23f Mi $2.00, Enl Pr $5.00. PB 104782

1. Fertilizers and manures, Phosphoric - Germany 2. Sulfur - Production - Germany 3. Sulfuric acid - Production - Germany 4. Rhenania phosphate - Germany 5. Lubeck phosphate - Germany 6. Phosphates - Production - Germany 7. BIOS FR 880 8. Micro BIOS FD 3072/48, Frames 1-20.

Abstract included.

HEAT CAPACITY, ENTROPY AND FREE ENERGY OF SODIUM BOROHYDRIDE, by David Boodman, G. Stegeman, and L. S. Mason. Pittsburgh. University. Dept. of Chemistry. Oct 1949. 10p graph, table Mi $1.25, Ph $1.25. PB 105026

1. Sodium borohydrides - Thermal properties 2. Sodium borohydrides - Entropy.

Contract N6ori-43, Task order I.

PHYSICAL ADSORPTION FROM MIXTURES OF GASES: I. OXYGEN-NITROGEN AND OXYGEN-ARGON ON CHROMIC OXIDE GEL AT -185.6°C. II: OXYGEN-ARGON ON SILICA GEL AT 0°C, by Locke White, Jr. and Charles H. Schneider. Southern Research Institute, Birmingham, Alabama. Jan 1949. 39p drawing, graphs, tables Mi $2.25, Ph $5.00. PB 105020

1. Adsorption - Research 2. Oxygen compounds - Adsorption.

Contract N7 onr-385, T. O. I. In Journal of the American Chemical Society, Vol. 71, p. 2593-2600, Aug 1949.

PROPERTIES OF DIELECTRIC CRYSTALS. TECHNICAL REPORT NO. 12: SELF-DIFFUSION AND IONIC CONDUCTIVITY OF THE SODIUM ION IN SODIUM BROMIDE, by H. Nelson Crooks. Carnegie Institute of Technology. Dept. of Physics. Aug 1949. 76p drawings, diagrs, graphs, tables Mi $3.50, Ph $10.00. PB 105036

Radioactive tracer methods have been used to measure directly the self-diffusion coefficient of the sodium ion in single crystals of sodium bromide at temperatures between 325°C and 700°C. The values obtained have been compared with values calculated from the measured electrical conductivity using the Einstein relation. It is observed that the Eistein relation is satisfied at temperatures above 400°C, but that below 400°C the values measured directly are higher than those calculated from the electrical conductivity. The hypothesis of Mapother, that this

failure of the Einstein relation is due to the presence of mobile complexes formed by the combination of multivalent ions and positive-ion vacancies, is re-examined and the conclusion reached that the experimental evidence is insufficient to prove or disprove it. Contract N6 ori-47, Task order II, NR 017-401.

ZERO-PRESSURE THERMODYNAMIC PROPERTIES OF CARBON MONOXIDE AND NITROGEN, by John A. Goff and Serge Gratch. Pennsylvania. University. Thermodynamics Laboratory. Aug 1949. 35p graphs, tables (1 fold) Mi $2.25, Ph $5.00. PB 105022

In this report are presented tables of the principal thermodynamic properties of carbon monoxide and of nitrogen along the zero-pressure isobar in the range 100 to 5000 ^{o}R at the intervals indicated by the numbers in parentheses as follows: 100(5)130(10)240(20) 500(50)1000(100)2000(200)5000. The data have been computed by the method of quantum statistical mechanics in the University of Pennsylvania Thermodynamics Research Laboratory under Project G-3. Computational accuracy well beyond present physical accuracy has been maintained for practical reasons. It is believed that the tables given herein should supersede all previous ones. The calculated values are in satisfactory agreement with those obtained from calorimetric and acoustic velocity measurements. Contract N6 onr-249-07. To be presented at the 1949 ASME annual meeting.

DETERIORATION STUDIES

TROPICAL DETERIORATION PREPARATION AND PRESERVATION OF FUNGUS CULTURES OF MILITARY IMPORTANCE (REPORT ON QMC PROJECT NO. 60), by William H. Weston. U. S. Office of the Quartermaster General. Military Planning Division. Research and Development Branch, General Laboratories. Aug 1949. 80p tables Mi $3.50, Ph $10.00. PB 104374

The most valuable feature of this report is the identification catalogue of the collection, presenting the names of the fungi in classificational and alphabetical arrangement, with corresponding code numbers. The degree of completeness of the identifications is discussed; the scope and extent of the catalogue are noted; the usefulness of the list as a directory and check-list of the fungi concerned in deterioration is emphasized. The derivation, sources and background of the various series of cultures included in the collection are given; the code numbering system by which the cultures are designated is explained; the effectiveness of the list in furnishing highly significant information as to frequency of these fungi by localities, by items, or by seasons is emphasized and exemplified. QMC MSR 15.

ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

Communication Equipment

POLAR BLACKOUTS RECORDED AT THE KIRUNA OBSERVATORY, by Rune Lindquist. Chalmers University of Technology, Gothenburg, Sweden. 1951. 25p photos, graphs Mi $2.00, Ph $3.75. PB 104717

1. Radio waves - Attenuation - Measurements - Sweden 2. Radio reception - Interference effects - Sweden 3. Chalmers University of Technology, Gothenburg, Sweden. Transactions nr. 103 4. Chalmers University of Technology, Gothenburg, Sweden. Research Laboratory of Electronics. Report no. 16.

REPORT OF THE RADIO RESEARCH BOARD FOR THE YEAR 1949. Gt. Brit. Dept. of Scientific and Industrial Research. Radio Research Board. 1951. 57p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104803

1. Radio - Research - Gt. Brit.
S. C. Code no. 47-77-0-49.

Electronics

DEVELOPMENT REPORT ON SUBMINIATURE R. F. PENTODE Z-1723, RMA 5797, H. F. TWIN TRIODE Z-1724, RMA 5798. FINAL REPORT by W. T. Millis. General Electric Co. Tube Division, Owensboro, Ky. Jun 1949. 286p photos, diagrs, drawings (part fold), tables Mi $9.00, Ph $36.25. PB 104781

The final development, procedures, instructions, specifications, and photographs pertaining to the General Electric RF pentode Z-1723 and HF twin triode Z-1724 are covered in detail. Among tube specifications and characteristics considered were size, voltages, frequency, ambient temperature, altitude, microphonics, fatigue, vibration, shock, stabilization, and tube life. These requirements for the indirectly heated cathode (1-watt heater) type tubes were met satisfactorily. The developed tubes have proved to be rugged, able to withstand wide variations of ambient temperatures, and are manufacturable in large quantities. The course of development of getters stems and bulbs, electrical and mechanical design characteristics, the 400 megacycle circuit, and the production problems encountered are also included. For Wright Field, Dayton, Ohio. G. E. requisition EDG25008. Contract W33-038-ac-18166. Appendices A and B consists of photos and drawings. Drawings on pages 273-276 of Appendix B are illegible.

NOISE MEASUREMENTS ON A TRAVELING WAVE TUBE, by Bertil N. Agdur and Carl-Gösta L. Asdal. Chalmers University of Technology, Gothenburg, Sweden. 1951. 9p diagr, graphs Mi $1.25, Ph $1.25. PB 104704

1. Tubes, Traveling wave - Noise measurements - Sweden 2. Noise - Measurement - Sweden 3. Chalmers University of Technology, Gothenburg, Sweden. Transactions no. 106. 4. Chalmers University of Technology, Gothenburg, Sweden. Research Laboratory of Electronics. Report no. 19.

Transactions of Chalmers University of Technology, nr. 106. Reports from the Research Laboratory of Electronics no. 19.

PRECISE MEASUREMENT OF THE TEMPERATURE COEFFICIENT OF CAPACITANCE, by Isidore Bady. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Jun 1951. 30p photos, diagrs, tables Mi $2.00, Ph $3.75. PB 104721

Sources of errors in the measurement of temperature coefficient of capacitance are discussed. The most important source of error is in the sample holder. The addition of a shield around the "high" contacting spring greatly reduces errors due to the sample holder and makes it possible to measure in-

crements of capacitance over the range of -55°C to 85°C with an accuracy of 0.001 micromicrofarads. A technique for the automatic measurement of temperature coefficient of capacitance is also described. Signal Corps project no. 2006-1. Dept. of the Army project no. 3-26-00-601. SCEL TM M1382.

STROBOSCOPIC X-RAY DIFFRACTION INVESTIGATION OF PIEZOELECTRICALLY OSCILLATING CRYSTALS, by R. Pepinsky. 10TH QUARTERLY PROGRESS REPORT UNDER CONTRACT NO. W36-039-SC-32031, PROJECT 2001-9. Auburn Research Foundation, Auburn, Ala. Sep 1948. 37p diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104958

1. Crystals, Piezoelectric - X-ray inspection
2. SIG Contract W36-039-sc-32031, Report no. 10.

STUDY OF SYNTHETIC WATER SOLUBLE PIEZOELECTRIC CRYSTALS FOR FREQUENCY CONTROL: FINAL REPORT ON CONTRACT NO. W-28-003-SC-1538, U. S. SIGNAL CORPS. Brush Development Company, Cleveland, Ohio. Apr 1948. 126p photos, drawings, (1 fold) diagrs, tables Mi $5.00, Ph $16.25. PB 104719

The work covered by this report extended over a wide range in the field of piezoelectric crystals. Of the crystals found or indicated to be useful on the basis of our work, only two, potassium pentaborate and lithium potassium sulfate, were listed in the original specifications for the contract. Another, potassium tartrate (DKT) had been proposed as an object of investigation in discussions. Its useful properties were soon after disclosed by others who also discovered a new important piezoelectric crystals, EDT. Some additional interesting properties and a new cut of this crystal were found brought discovery of promising frequency characteristics of SHA, a new piezoelectric crystal found. Fairly complete coverage was attempted only for those crystals which showed promising properties as measurements progressed. Many crystals of mediocre general properties were abandoned when the most accessible modes showed unfavorable temperature coefficients. Work was carried on under the general supervision of Dr. C. B. Sawyer, Vice President and Dr. S. J. Begun, Vice President and Chief engineer. The men engaged in work for this contract were, Dr. Hans Jaffe, Dr. H. G. Baerwald, Edward Brazis, Gilbert N. Cotton, James Mumper and Dr. T. J. Turobinski.

THEORY OF ANTENNAS DRIVEN FROM A TWO-WIRE LINE, by Ronold King. Harvard University. Cruft Laboratory, Cambridge, Mass. Jun 1948. 118p diagrs, graphs Mi $4.75, Ph $15.00. PB 105012

Theoretical models of antennas driven by hypothetical generators are contrasted with antennas driven from actual transmission lines. The coupling between a two-wire line and the antenna it drives and end-effects on the line are considered in their relationship to the definition of an independent impedance for the antenna. It is concluded that a physically significant impedance can be defined only outside a terminal zone near the junction of load and line. The derivation and approximate solution of generalized transmission-line equations that take account of coupling-effects and end-effects are given for (1) antenna as end-load in the plane of a two-wire line with and without a high-impedance stub support; (2) antenna as center-load in the plane of a two-wire line symmetrically driven at each end; (3) antenna as end-load in the plane perpendicular to the line with stub support. Theoretical predictions of measured impedances defined outside a terminal zone on a feeding line in these several arrangements may differ greatly from one another and from the ratio of scalar potential difference to current for an isolated antenna with gap. These differences are due primarily to capacitive end-effects and coupling-effects of which account may be taken by a lumped positive or negative capacitance across the load terminals of an ideal transmission line. Inductive effects are also involved but are relatively small. Methods for evaluating the elements in a terminal-zone network are given. The theoretical results are verified experimentally with good agreement in all cases. Technical report no. 41. Contract N5ori-76, Task order no. 1, NR-078-011. HU CL TR 41.

UNDERWATER DIFFRACTION OF ULTRASONIC WAVE BY CIRCULAR CYLINDERS, by Eugene S. Taylor. Princeton University. Dept. of Electrical Engineering. Jun 1949. 36p diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 105043

This report deals with the underwater diffraction of sound waves. Ultrasonic waves, whose wavelengths is of the same order of magnitude as the scattering obstacle, are incident on circular cylinders which have both rigid and pressure release walls. The frequency of sound used is 60 kc, and the resulting diffraction field is investigated both theoretically and experimentally. Contract N6onr-270, T. O. V. (Reference no. NR014-201).

WAVEGUIDE ATTENUATION TABLES (A.F. PROBLEM NO. 30-B) PROBLEM REPORT NO. 14, PREPARED FOR 3151ST ELECTRONICS GROUP, WATSON LABORATORIES, AMC, RED BANK, N. J. Harvard University. Computation Laboratory. Jul 1949. 11p diagr, tables Mi $1.75, Ph $2.50. PB 105004

Existing techniques and equipment do not permit accurate measurements of power input and power output in a low attenuation microwave device. This report describes a method of finding the attenuation in waveguides and coaxial transmission lines by measurements of the standing wave patterns existing in a shorted section. Tables are included for converting the measurements into values of attenuation. Statement of problem by Joseph H. Vogelman, Watson Laboratories; explanation of tables by Warren Semon.

X-RAY ABSORPTION CORRECTIONS FOR SINGLE CRYSTALS, by H. T. Evans, Jr. Massachusetts Institute of Technology. Laboratory for Insulation Research. Jul 1951. 16p diagrs, tables Mi $1.75, Ph $2.50. PB 104811

It is shown in this paper that exact expressions may be derived for the absorption factor for the intensity of Bragg reflection by a small euhedral crystal completely bathed in a parallel X-ray beam. The expression is a sum of terms evaluated for subdivisions of the crystal determined according to discontinuities in boundary conditions imposed by the distribution of edges between the plane faces of the crystal. For a prismatic crystal of constant cross section, general expressions are derived for five general types of subdivisions in terms of the linear absorption coefficient and certain linear dimensions. Other expressions are also given for other types of subdivisions which arise in certain cases. The application of the method, including corrections for secondary extinction, is

illustrated by calculations on tetragonal barium titanate. ONR contract N5 ori-07801. MIT LIR TR 45.

Miscellaneous

ELECTROMAGNETIC RELAYS AT LOW TEMPERATURES, by C. D. Crater. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. May 1950. 42p photos, diagrs, graphs Mi $2.50, Ph $6.25. PB 105007

1. Relays, Electromagnetic - Effect of low temperatures 2. Low temperature research 3. Winterization - Equipment - Tests 4. SCEL TM M1286.

Report prepared by Stanley Grubman, Electrical Engineer. Signal Corps Project no. 2008-2. Dept. of the Army Project no. 3-91-02-809.

LIQUID NITROGEN-COOLED MAGNETS, by James J. Fritz, Oscar D. Gonzalez and Herrick L. Johnston. Ohio State University Research Foundation, Columbus, Ohio. Jul 1949. 16p photo, tables Mi $1.75, Ph $2.50. PB 105041

1. Magnets, Solenoid - Nitrogen-cooled 2. Ohio State University. Cryogenic Laboratory, Columbus, Ohio.

Contract N6-onr-225, T. O. III, ONR project no. NR 016407: Superconductivity and liquid helium II at the temperature of liquid helium.

FOOD AND KINDRED PRODUCTS

FLAVOR AND ACCEPTABILITY OF MONOSODIUM GLUTAMATE. PROCEEDINGS OF THE SYMPOSIUM, MAR 4, 1948, STEVENS HOTEL, CHICAGO, ILL., SPONSORED JOINTLY BY QUARTERMASTER FOOD AND CONTAINER INSTITUTE FOR THE ARMED FORCES AND ASSOCIATES, FOOD AND CONTAINER INSTITUTE. U. S. Quartermaster Food and Container Institute. Mar 1948. 92p photos, diagr Mi $4.25, Ph $12.50. PB 104740

Contents: The first symposium on monosodium glutamate, by W. Franklin Dove. - History of glutamate production, by A. E. Marshall. - Quality production of glutamates, by Paul D. V. Manning and B. F. Buchanan. Meat flavor and observations on the taste of glutamate and of other amino acids, by E. C. Crocker. - Effect of monosodium glutamate on food flavor, by S. E. Cairncross. - Taste of monosodium glutamate and other amino acid salts in dilute solutions, by Stephen L. Galvin. - Use of monosodium glutamate in sea food products, by Carl Fellers. - Evaluation of glutamate in food specialties, by John H. Nair. - Protein hydrolysates as a source of glutamate flavors, by Lloyd A. Hall. - Relation of glutamate to the Browning reaction, by M. L. Anson. - Significance of thresholds of taste acuity in seasoning with glutamate, by Rosaltha Sanders. - Pharmacology of glutamic acid, by Carl Pfeiffer. - Bibliography of monosodium glutamate and related literature, by Dr. Donald Washburn.

READY RECKONER OF FOOD VALUES: PROTEIN, FAT AND CALORIE VALUES OF FOODS BY STANDARD QUANTITIES FOR THE USE OF CATERERS. GT. Brit. Ministry of Education. 1951. 58p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 104804

1. Food - Analysis - Gt. Brit. 2. Calories - Tables - Gt. Brit.

S. O. Code no. 27-295.

FUELS AND LUBRICANTS

BENCH-SCALE STUDIES OF THE FISCHER-TROPSCH SYNTHESIS OVER IRON, NICKEL, AND NICKEL-COBALT CATALYSTS (JAPAN), BY SHIRO WATANABE, REVISED AND EDITED by R. C. Grass. U. S. Bureau of Mines. Jun 1951. 36p diagrs, graphs, tables Mi $2.25, Ph $5.00. Limited supply available free from U. S. Bureau of Mines, Dept. of the Interior, Washington 25, D. C. PB 104540

1. Fischer-Tropsch process - Japan 2. Catalysts, Hydrogenation - Japan 3. Catalysts, Iron - Japan 4. Catalysts, Nickel - Japan 5. Catalysts, Nickel-cobalt - Japan 6. BM IC 7611.

EQUIPMENT LISTED AT THE BUREAU'S OIL-SHALE MINE, by Fred D. Wright, Homer J. Ballinger, Ernest E. Burgh, Brinton C. Brown, and Lothar Fieg. U. S. Bureau of Mines. Aug 1951. 30p photos, drawing, diagr Mi $2.00, Ph $3.75. Limited supply available free from U. S. Bureau of Mines, Publication Section, 4800 Forbes St., Pittsburgh 13, Pa. PB 104998

1. Mines and mining - Equipment 2. Oil shales - Plants 3. BM RI 4810.

FORMATION OF SULFIDE FILMS ON STEEL AND EFFECT OF SUCH FILMS ON STATIC FRICTION, by Erva C. Levine and Marshall B. Peterson. U. S. National Advisory Committee for Aeronautics. Sep 1951. 26p photos, graphs Mi $2.00, Ph $3.75. PB 104978

Experimental studies were conducted to evaluate the formation of sulfide films on heated steel specimens immersed in solutions of free sulfur in cetane and to establish the necessary film thickness for effective lubrication under static friction conditions. NACA TN 2460.

OIL-SHALE INDUSTRIES OF EUROPE, by Boyd Guthrie and Simon Klosky. U. S. Bureau of Mines. May 1951. 141p photos, maps, drawings, diagrs, graphs, tables Mi $5.75, Ph $18.75. Limited supply available free from U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa. PB 103759

1. Oil shales - Europe 2. BM RI 4776.

OIL-SHALE OPERATIONS IN NEW SOUTH WALES, AUSTRALIA, by A. J. Kraemer and H. M. Thorne. U. S. Bureau of Mines. Jul 1951. 75p photos, diagrs (part fold), map, tables Mi $3.50, Ph $10.00. Available free from U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa. PB 104808

1. Oil shales - Plants - New South Wales 2. Shale oil industry - New South Wales 3. BM RI 4796.

THEORETISCHE UNTERSUCHUNG DES SCHMIERDRUCKEN ZWISCHEN WALZEN BEI KONSTANTER UND BEI DRUCKABHÄNGIGER ZÄHIGKEIT (THEORETICAL INVESTIGATION OF THE OIL PRESSURE BETWEEN ROLLERS WITH BOTH CONSTANT AND PRESSURE-DEPENDENT VISCOSITY), by C. Weber. 1949. 39p diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104682

1. Oil pressure - Germany 2. Lubricants - Viscosity - Germany 3. Roller bearings - Research - Germany 4. Roller bearings - Lubrication - Germany 5. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 6. DSIR SR 8.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 108. Contains parts I-II.

THEORETISCHE UNTERSUCHUNG DES SCHMIERDRUCKES ZWISCHEN WALZEN BEI KONSTANTER UND BEI DRUCKABHÄNGIGER ZÄHIGKEIT. TEIL III. (THEORETICAL INVESTIGATION OF OIL PRESSURE BETWEEN ROLLERS, WITH CONSTANT AND PRESSURE-DEPENDENT VISCOSITY. PART III), by C. Weber. Aug 1949. 19p graphs, tables Mi $1.75, Ph $2.50. PB 104683

1. Oil pressure - Germany 2. Lubricants - Viscosity - Germany 3. Roller bearings - Research - Germany 4. Roller bearings - Lubrication - Germany 5. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 6. DSIR SR 9.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 113.

VERSUCHE ZUM EINFLUSS DER OELZÄHIGKEIT AUF DIE WALZFESTIGKEIT TAUCHGESCHMIERTER ZAHNFLANKEN (EXPERIMENTS ON THE EFFECT OF OIL VISCOSITY ON THE ROLLING STRENGTH OF OIL-IMMERSED GEAR FLANKS), by H. Glaubitz. Jul 1949. 20p photos, diagrs, graphs, tables Mi $1.75, Ph $2.50. PB 104681

1. Gears - Lubrication - Germany 2. Lubricants - Viscosity - Effect on gears - Germany 3. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 4. DSIR SR 7.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 112.

INSTRUMENTS

DIGITAL COMPUTER RESEARCH AT THE T. R. E., MALVERN, by Sherman E. Lowell. U. S. Office of Naval Research London Branch. Mar 1950. 5p Mi $1.25, Ph $1.25. PB 104713

1. Computers, Digital 2. ONRL TR 35-50.

FLAME PHOTOMETRIC ANALYSIS, by K. Saddington, W. Fullwood, and A. M. Smales. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Dec 1950. 23f drawings, graphs, tables Mi $2.00, Enl Pr $5.00. PB 104790

1. Atomic power - Research - Gt. Brit. 2. Photometers, Flame - Gt. Brit. 3. Photometry - Gt. Brit. 4. Micro AERE C/R 644 5. Micro BRR 8/51.

Abstract included. Abstract available as PB 104790s 1p. Mi $1.25, Ph $1.25.

INSTALLATION AND OPERATING INSTRUCTIONS FOR SCALER TYPE AEP 908 AND AUTO-CONTROL UNIT TYPE AEP 116, by W. D. Howe. National Research Council of Canada. Atomic Energy Project. n.d. 24p photos, diagrs Available from National Research Council of Canada, Ottawa, Canada. $.20. PB 104996

1. AEP 908 (Scaler) 2. AEP 116 (Auto-control unit) 3. Atomic power - Research - Canada 4. Scalers - Operation - Research - Canada 5. Controls, Automatic - Operation - Canada 6. NRCC AEP IM 10 7. NRCC 2402.

INSTRUMENT EMPLOYING A CORONAL DISCHARGE FOR THE DETERMINATION OF DROPLET-SIZE DISTRIBUTION IN CLOUDS, by Rinaldo J. Brun, Joseph Levine, and Kenneth S. Kleinknecht. U. S. National Advisory Committee for Aeronautics. Sep 1951. 47p photos, drawing, diagr, graphs, tables Mi $2.50, Ph $6.25. PB 104977

A flight instrument that uses electric means for obtaining a measure of the droplet-size distribution in above-freezing clouds has been devised and given preliminary evaluation in flight. An electric charge is placed on the droplets and they are separated aerodynamically according to their mass. The desirable features of an instrument based on the method described are: (1) the instrument can be used in clouds with temperatures above freezing, (2) the size and the shape of the cylinders do not change during the exposure time, (3) the error caused by bounce-off is low, (4) the readings are instantaneous and continuous, and (5) the fast instrument response permits the study of variations in cloud structure. NACA TN 2458.

INVESTIGATION OF MAGNETIC RECORDING SYSTEMS, 27TH MONTHLY PROGRESS REPORT FOR SEPT. 1948, by Lynn C. Holmes. Stromberg-Carlson Co., Rochester, N. Y. Oct 1948. 6p Mi $1.25, Ph $1.25. PB 104957

1. Recorders, Magnetic 2. SIG Contract W36-039-sc-32278, Report no. 27.

Contract no. W-36-039-sc-32278. Dept. of the Army project: 3-99-04-022. Signal Corps project: 192B. Stromberg-Carlson project RGE-9017.

INVESTIGATIONS OF THE MEASUREMENT OF NOISE. PROGRESS REPORT NO. 21, 1 APR 1951 TO 30 JUN 1951 UNDER CONTRACT NOBSR 49128, INDEX NE-120803, PREPARED by Conrad E. Fowler. Pennsylvania. University, Moore School of Electrical Engineering, Philadelphia, Pa. Jul 1951. 8p diagr, tables Mi $1.25, Ph $1.25. PB 105003

1. Noise - Measurement 2. Meters, Sound 3. U. S. Bureau of Ships.

Research Division report no. 52-11.

MANCHESTER UNIVERSITY DIGITAL COMPUTER, by Sherman C. Lowell. U. S. Office of Naval Research. London Branch. Mar 1950. 6p. Mi $1.25, Ph $1.25. PB 104712

1. Computers, Digital 2. ONRL TR 34-50.

MODEL CGR-57-4 AIRCRAFT FREQUENCY INDICATOR (SERIAL NUMBERS 1 TO 7) MANUFACTURED FOR U. S. COAST GUARD UNDER CONTRACT TCG-26706. Radio Research Company, Inc., Washington, D. C. Jan 1937. 28p fold photos, fold graph Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.75. PB 104739

1. CGR 57-4 (Frequency indicator) 2. Indicators, Frequency 3. U. S. Coast Guard.

PHOTOELECTRIC DETERMINATION OF TRACK DENSITIES IN NUCLEAR EMULSIONS, by S. Fred Singer. U. S. Office of Naval Research. London

Branch. Aug 1951. 12p Mi $1.75, Ph $2.50. PB 104994

Basically it involves measurement of the light transmitted through a slit when the field of view contains a track, and comparison of this with the background. The method appears to be of value for higher grain densities (greater than about four times minimum) and appears to be particularly suited to the rapid identification of particles which come to rest in the emulsion. The application of this method to determination of the ratio of the masses of π - and μ -mesons has yielded values which are much higher than the accepted value of 1.31. Report of method determined by S. von Friesen and K. Kristiansson at University of Lund. ONRL TR 71-51.

PROJECT WHIRLWIND. REPORT R-150: PULSE MIXER, by Robert R. Rathbone. Massachusetts Institute of Technology. Servomechanisms Laboratory. Jun 1949. 20p photos, fold drawing, diagrs Mi $1.75, Ph $2.50. PB 105017

1. Pulse circuits - Mixers 2. MIT SL R150.

Contract N5-ori-60, Project NR-720-003. Project 6345.

SIMPLE RADIOMETER FOR THE MEASUREMENT OF HIGH INTENSITIES OF SOFT X-RAYS, by H. G. Heal. National Research Council of Canada. Atomic Energy Project. Jan 1951. 7p drawing Available from National Research Council of Canada, Ottawa, Canada. $.10. PB 104997

1. Atomic power - Research - Canada 2. Radiometers - Canada 3. X-rays - Intensities - Measurement - Canada 4. NRCC AEP CRC 468 5. NRCC 2434.

16KW PANORAMIC IONOSPHERIC RECORDER, by Rune Lindquist. Chalmers University of Technology, Gothenburg, Sweden. 1951. 41p photos, diagrs, graphs Mi $2.50, Ph $6.25. PB 104707

1. Ionosphere - Research - Sweden 2. Recorders, Electrical - Sweden 3. Chalmers University of Technology, Gothenburg, Sweden. Transactions nr. 109 4. Chalmers University of Technology, Gothenburg, Sweden. Research Laboratory of Electronics. Report no. 23.

Transactions of Chalmers University of Technology nr. 109. Reports from the Research Laboratory of Electronics no. 23.

TWO NEW FORMS OF MELTING POINT CALORIMETERS FOR DETERMINING THE PURITY OF LIQUIDS OR CONDENSED GASES, by John T. Clarke, Herrick L. Johnston and Warren DeSorbo. Ohio State University Research Foundation, Columbus, Ohio. Jul 1949. 19p drawing, diagr, graphs Mi $1.75, Ph $2.50. PB 105040

1. Calorimeters - Design 2. Ohio State University, Cryogenic Laboratory, Cleveland, Ohio.

Contract N6onr-225, T. O. IX, ONR project no. NR 058061: Low temperature thermodynamics of the boranes. Technical report no. 2.

U. S. COAST GUARD PRESELECTOR TYPE MR-148, CONTRACT TCG 34296. Radio Manufacturing Engineers, Inc., Peoria, Ill. Mar 1942. 10p photos, diagrs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.25. PB 104773

1. MR-148 (Preselector) 2. Circuits, Preselector 3. U. S. Coast Guard.

LEATHER AND LEATHER PRODUCTS

NEUERE MITTEILUNGEN ÜBER SYNTHETISCHE GERBSTOFFE (RECENT INFORMATION ON SYNTHETIC TANNING MATERIALS). I. G. Farbenindustrie A. G., Frankfurt am Main, Ger. May 1939. 138f (Text in German) Mi $5.50, Enl Pr $18.75. PB 104783

1. Tanning agents, Synthetic - Germany 2. Tanigan (Tanning agent) 3. Micro BIOS FD 1168/45, Frames 28904-29040.

English abstract included. Abstract available as PB 104783s. 1p. Mi $1.25, Ph $1.25. Accompained by leaflets on Tanigan.

MACHINERY

APPROXIMATE DESIGN METHOD FOR HIGH-SOLIDITY BLADE ELEMENTS IN COMPRESSORS AND TURBINES, by John D. Stanitz. U. S. National Advisory Committee for Aeronautics. Jul 1951. 76p diagrs, graphs, tables Mi $3.50, Ph $10.00. PB 104638

An approximate blade-element design method is developed for compressible or incompressible nonviscous flow in high-solidity stators or rotors of axial-, radial-, or mixed-flow compressors, turbines, or two-dimensional cascades. The method is based upon channel-type flow between blade elements on a specified surface of revolution that lies between the hub and shroud (casing) and is concentric with the axis of the compressor turbine. The blade element is designed for prescribed velocities along the blade-element profile as a function of distance along meridional lines on the surface of revolution. Two numerical examples are presented: (1) the design of a blade-element profile for a plane two-dimensional cascade in compressible flow with prescribed velocities along the profile; and (2) the design of a blade element for the impeller of a mixed-flow centrifugal compressor. NACA TN 2408.

BERICHT ÜBER DEM STAND DER VERSUCHE AN DEN WALZENPRÜFSTÄNDEN (EXPERIMENTS ON DISC-TESTING MACHINES), by O. Kraupner. Oct 1949. 31p drawings (3 fold), graphs Mi $2.25, Ph $5.00. PB 104676

1. Steel - Testing equipment - Germany 2. Machines, Testing - Germany 3. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 4. DSIR SR 2.

Translation of Institut für Maschinenelemente Technische Hochschule, Braunschweig, Einzelbericht nr. 117.

BIHARMONIC RELAXATION METHOD FOR CALCULATING THERMAL STRESS IN COOLED IRREGULAR CYLINDERS, by Arthur G. Holms. U. S. National Advisory Committee for Aeronautics. Aug 1951. 49p diagrs, graphs, tables Mi $2.50, Ph $6.25 PB 104863

A numerical method was developed for calculating thermal stresses in irregular cylinders cooled by

one or more internal passages. The use of relaxation methods and elementary methods of finite differences was found to give approximations to the correct values when compared with previously known solutions for concentric circular cylinders possessing symmetrical and asymmetrical temperature distributions. NACA TN 2434.

CONCRETE BLOCK MAKING MACHINES, by A. Sobolev. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, Eng. 1951. 30p photo, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.30. PB 104694

1. Blocks, Concrete - Manufacture - Gt. Brit. 2. Machines, Concrete block making - Gt. Brit. 3. DSIR NB SR 17.

S. O. Code no. 70-643.

DESCRIPTION OF A UNIVERSAL, FULLY AUTOMATIC TURRET LATHE. Borchert, Emil, A. G., Berlin. n.d. 20f photos, drawings, tables (Text in German) Mi $1.75, Enl Pr $3.75. PB 104786

1. Lathes, Turret - Germany 2. UA150 (Lathe) 3. Micro BIOS FD 168/51, Frames 1-19.

English abstract included. Abstract available as PB 104786s. 1p. Mi $1.25, Ph $1.25.

EINFLUSS DER VERFORMUNG UND DER LAGERFEHLER AUF DIE TRAGFÄHIGKEIT VON ZAHNRADGETRIEBEN. TEIL II: VERFORMUNG DES RITZELKORPERS DURCH TORSION, QUERKRAFT UND BIEGUNG (DEFORMATION OF LOADED GEARS AND THE EFFECT ON THEIR LOAD CARRYING CAPACITY. PART II: DEFORMATION OF THE PINION BODY BY TORSION, SHEARING FORCE AND BENDING MOMENT), by C. Weber. Mar 1949. 9p graphs, tables Mi $1.25, Ph $1.25. PB 104678

1. Gears - Deformation - Germany 2. Torsion - Measurements - Germany 3. Shear - Distribution - Germany 4. Bending moments - Germany 5. Braunschweig. Technische Hochschule. Institute für Maschinenelemente 6. DSIR SR 4.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 103.

EINFLUSS DER VERFORMUNG UND DER LAGERFEHLER AUF DIE TRAGFÄHIGKEIT VON ZAHNRADGETRIEBEN. TEIL III: ELASTISCHE FORMÄNDERUNG LANGER ZÄHNE. TEIL IV: ELASTISCHE FORMÄNDERUNG DER ZAHNE BEI SCHRÄGVERZAHNTEN RÄDERN (DEFORMATION OF LOADED GEARS AND THE EFFECT ON THEIR LOAD-CARRYING CAPACITY. PART III: ELASTIC DEFORMATION OF LONG TEETH. PART IV: ELASTIC DEFORMATION OF TEETH IN HELICAL TOOTHED WHEELS), by C. Weber. Sep 1949. 18p graphs, diagr, table Mi $1.75, Ph $2.50. PB 104679

1. Gears - Deformation - Germany 2. Mathematical equations and solutions - Germany 3. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 4. DSIR SR 5.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 114.

GAS TURBINE REGENERATOR DESIGN STUDIES, by W. M. Kays and A. L. London. Navy contract N6-onr-251, Task order 6 (NR-035-104). Stanford University. Dept. of Mechanical Engineering, Stanford, Calif. Dec 1949. 58p drawings, graphs, tables Mi $2.75, Ph $7.50. PB 104925

The objective of this report is to study the possibilities in shape and volume to be expected for a gas turbine regenerator incorporating compact high-rating heat transfer surfaces. Four gas turbine cycles are specified and twenty-two different designs of regenerator are presented employing various compact heat transfer surfaces. Two types of heat exchanger are considered -- direct-transfer, and coupled-indirect-transfer, the latter employing a liquid metal as a coupling medium. The results of this study indicate that very compact direct-transfer regenerators of reasonable shape are possible employing high rating heat transfer surfaces for which heat transfer and flow friction data are now available. The coupled-indirect-transfer system, employing a liquid metal such as mercury or a sodium-potassium alloy, also appears very attractive for the gas turbine regenerator application. It is concluded that a very considerable developmental effort is justified to fabricate high-rating heat transfer surfaces for high temperature service and to develop a liquid metal suitable for regenerator application. Based on a paper presented at the summer meeting of the ASME June 1949. SU ME TR 8.

GOOD WORKMEN DESERVE GOOD TOOLS, A HISTORICAL SKETCH OF A PROGRAM TO IMPROVE TOOLS AND ITS RESULTS. U. S. Bureau of Ships. Aug 1951. 10p photos, graph Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.25. PB 104848

1. Tools 2. NAVSHIPS IN 113.

KRAFTFAHRTECHNISCHE ÜBERWACHUNG, HFT. 1: LEHRGANG GENERATORGASFAHRZUGE. Germany. Reichsstelle für die Technische Überwachung des Kraftfahrzeugverkehrs. 1940. 48f photos, graphs tables (Text in German) Mi $2.50, Enl Pr $7.50. PB 104788

1. Engines, Producer gas - Germany 2. Gas, Producer - Germany 3. Wood gas - Use as fuel - Germany 5. Imbert wood-gas producer plant - Germany 5. Micro BIOS FD 833/49, Frames 1-48.

Contents: Begrussungsansprache (Greetings) by Karl Vigener. - Theoretische grundlagen des gaserzeugerbetriebes (Theory of operation of gas producers) by Dr. Schultes. - Umstellung der wirtschaftsfahrzeuge auf heimische triebstoffe, insbesondere auf gasgeneratoren (Measures for a change-over to home-produced fuels, particularly to gas producer plant) by Albers. - Imbert-holzgasanalge in aufbau, wirkungsweise und wartung (Design, operation and maintenance of "Imbert" wood-gas producer plant) by Heller. Abstract available as PB 104788s. 1p. Mi $1.25, Ph $1.25.

NOTE ON DIFFERENTIAL GEARING AS A MEANS OF AILERON BALANCE, by S. B. Gates. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Dec 1940. 26p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 104696

It has been suggested in some American investigations that differential gearing, combined with adjustment of the aileron floating angle by means of a tab, may be a powerful method of balancing ailerons. This report sets out the theory of this method of

balance and analyses it in relation to the most pressing problem of aileron design, which is to obtain close balance at high speed without overbalance in any part of the range, or uncomfortable lightness at slow speed. It is shown that this result can be achieved more directly by differential balance than by any other method if the differential and the tab setting are nicely adjusted to the natural floating properties of the aileron. Thus if the aileron tends to float up as incidence increases, a differential giving more downwash than upward movement must be used, and this must be combined with an upward-set tab; while if the aileron tends to float down as the incidence increases, a differential giving more upward than downward movement must be used, combined with a down-set tab. After examining the possible disadvantages of the downward differential, and the loads set up by the tab, it is concluded that there is a strong case for exploration in flight of differential gearing as a major means of aileron balance. Some notes on the geometry of differential gearing are given in an Appendix. Cover date is 1951. S. O. Code no. 23-2526. ARC RM 2526.

REFRIGERATED OIL DIFFUSION PUMP BAFFLE, by R. S. Barton. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jan 1951. 13f drawings, graphs Mi $1.75, Enl Pr $3.75.
PB 104789

1. Atomic power - Research - Gt. Brit. 2. Pumps, Oil - Baffles - Gt. Brit. 3. Micro AERE G/R 642 4. Micro BRR 7/51.

Abstract included. Abstract available as PB 104789s. 1p. Mi $1.25, Ph $1.25.

SPRAYING EQUIPMENT FOR WEED CONTROL, by Gustave E. Fairbanks. Kansas. Engineering Experiment Station, Manhattan, Kansas. May 1951. 55p photos, drawings, diagrs, graphs Available from Director, Engineering Experiment Station, Kansas State College, Manhattan, Kansas. PB 104690

1. Spraying apparatus 2. KEES B66.

Kansas State College bulletin v. 35, no. 3.

MEDICAL RESEARCH AND PRACTICE

CONFERENCE ON ARTIFICIAL RESPIRATION HELD AT MEDICAL DIVISION, ARMY CHEMICAL CENTER, MARYLAND, ON 29-30 SEPTEMBER 1950. U. S. Chemical Corps. Medical Division. Army Chemical Center, Md. Apr 1951. 138p photos, diagrs, graphs, tables Mi $5.50, Ph $17.50. PB 103901

Contents: Introductory remarks, by David B. Dill and Julius H. Comroe. p. i. - Pressure-volume diagram of the chest, by Wallace O. Fenn. p. 1-7. - Fresh and sea water drowning, by Howard G. Swann. p. 9-22. - Pulmonary circulation in normal man, by Andre Cournand. p. 23-28. - Discussion led by F. G. Hall. p. 29-37. - Aspects of pulmonary physiology which determine the effectiveness of artificial respiration, by James L. Whittenberger, Jr. and John E. Affeldt. p. 39-49. - Experiments on the effects of respirators on the respiratory gas exchange, by Hurley L. Motley. p. 51-66. - Artifical respiration: a comparative study of different methods in adults including a new method, by Archer S. Gordon, David C. Fainer and A. C. Ivy. p. 67-97. - Discussion led by Robert C. Darling. p. 99-101. - Military requirements for artificial respiration. Introduction by John R. Wood. Discussion led by Arthur S. Gordon. p. 103. - Requirements of artificial respiration for treatments of CW casualties, by Milward W. Bayliss. p. 103-105. Army requirements, by John R. Wood. p. 105-109. - Navy requirements, by Paul F. Dickens, Jr. p. 110-111. - Air Force requirements, by O. I. Niemi, p. 111-112. - Discussion led by Archer S. Gordon. p. 112-118. - Suggestions on manual artificial respiration. p. 119-142. CC MD SR 5.

DISCRIMINATORY ANALYSIS. IV: NONPARAMETRIC DISCRIMINATION: CONSISTENCY PROPERTIES, by Evelyn Fix and J. L. Hodges, Jr., University of California, Berkeley. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Feb 1951. 21p Mi $2.00, Ph $3.75. PB 103907

1. Parameters, Stability 2. Statistical analysis 3. Mathematical equations and solutions 4. California. University. Statistical Laboratory 5. AAF SAM Project 21-49-004, Report no. 4.

Contract no. AF 41 (128)-31. For 1st-3d, 5th reports on this contract see PB 102690-102692,103908.

DISCRIMINATORY ANALYSIS, V: PERFECT DISCRIMINATION AS THE NUMBER OF VARIABLES INCREASES, by William R. Gaffey. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Feb 1951. 7p Mi $1.25, Ph $1.25. PB 103908

1. Statistical analysis 2. Mathematical equations and solutions 3. California. University. Statistical Laboratory 4. AAF SAM Project 21-49-004, Report no. 5.

Prepared at the University of California under Contract no. 41 (128)-31. For 1st-4th reports on this contract see PB 102690-102692, 103907.

EVALUATION OF METHODS FOR THE TREATMENT OF FROSTBITE, by Frank H. Lane and Jack Bollerud. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. Jan 1951. 14p tables Mi $1.75, Ph $2.50. PB 103911

1. Frostbite - Therapy 2. AAF AAL Project no. 21-01-012.

HYPODERMIC SYRINGES AND NEEDLES IN GERMANY. British Intelligence Objectives Sub-Committee. n.d. 52f drawings Mi $2.75, Enl Pr $8.75.
PB 104785

1. Needles, Hypodermic - Germany 2. Syringes, Hypodermic - Germany 3. BIOS FR 1875 4. Micro BIOS FD 134/51, Frames 1-51.

Abstract included. Abstract available as PB 104785s 1p. Mi $1.25, Ph $1.25.

MECHANISM OF POLYCYTHEMIA OCCURRING DURING HIGH-ALTITUDE ADAPTATION. III: INFRA-RED ABSORPTION SPECTRA FOR VARIOUS PORPHYRINS, by Charles W. Craven, Kurt R. Reissmann and Herman I. Chinn. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1951. 3p graphs Mi $1.25, Ph $1.25.
PB 104589

The infra-red absorption spectra for the following pigments are shown: bilirubin, protoporphyrin, deuteroporphyrin, and coproporphyrins I and III. The coproporphyrin isomers gave identical absorption. Absorption of coproporphyrin III at 5.72 microns was used to determine this compound

quantitatively. Adherence to the Beer-Lambert law was observed. AAF SAM Proj. 21-23-003, Report no. 3.

MEDICAL SCIENCE IN CENTRAL EUROPE, by Richard Pucher. Mar 1951. 87p Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $2.25. PB 104127

The present condiction of medical schools and a record of medical research in Central European institutions are outlined. Each medical school is discussed separately in regard to its faculty, buildings, equipment, and supplies. Exhaustive interviews with the heads of clinics and institutes, as well as with eminent scientists, reveal the desperate straits in which the schools find themselves. The report on medical progress in Central Europe is divided into two sections. In the first section important facts are offered under headings such as surgery, pathology, biochemistry, etc. In the second section facts on progress are grouped according to various medical objectives for investigation, such as general medicine, field of cancer, cardiology, neuro-psychiatry and neurology, venereal diseases, X-ray, and blood research. FIAT FR 1315.

OXYGEN CONSUMPTION OF THE RAT DURING PARTIAL INANITION, by Charles W. Craven. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1951. 5p graphs, tables Mi $1.25, Ph $1.25. PB 104300

The oxygen consumption of young male rats on a normal diet was determined by the closed-circuit technique. The rats were trained to minimal activity. After an exclusive diet of raw carrots and tap water, ad libitum for 10 days, the body weight had decreased 14 percent and the oxygen consumption, 22 percent below the normal value. This decrease was statistically significant. Upon refeeding the normal diet, body weight and oxygen consumption returned to approximately normal. It is concluded that the increased resistance to altitude of rats on an exclusive carrot diet can be attributed, in part, to their decreased oxygen requirement. AAF SAM Project 21-23-032.

PROCEEDINGS OF THE THIRD NATIONAL PUBLIC HEALTH ENGINEERING CONFERENCE, OCT 23-24, 1950, SPONSORED BY THE CIVIL ENGINEERING DEPARTMENT. Florida. Engineering and Industrial Experiment Station, Gainesville, Fla. Apr 1951. 44p Available from Florida Engineering and Industrial Experiment Station, College of Engineering, University of Florida, Gainesville, Fa. PB 104074

1. Sewage disposal systems 2. Public health - Engineering 3. Sanitation - Water supply 4. Sanitation, Suburban 5. Water supply - Sanitation 6. National Public Health Engineering Conference. 3rd, 1950 7. FEES B42.

Bulletin series no. 42. Engineering Progress at the University of Florida, Vol. 5, no. 7, Apr 1951.

PSYCHOLOGICAL INQUIRY INTO SEVERAL CASES OF FROSTBITE OCCURRING DURING "OPERATION SWEETBRIAR", WINTER 1949-1950, by Anthony Debons, Jimmie L. Johnson, Robert D. Skilton. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. Mar 1951. 12p graphs, tables Mi $1.75, Ph $2.50. PB 104533

1. Frostbite 2. Psychomotor test 3. AAF AAL Project 21-01-012, Report no. 2.

REFECTORS AND NIGHT VISIBILITY. Highway Research Board. Mar 1951. 59p photos, diagrs, graphs tables Available from Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. $.90. PB 103855

Bulletin 34. Presented at the twenty-ninth annual meeting 1949. Contents: Acrylic reflecting material which offers new and unique applications for traffic signs, by R. F. Hibbert, p. 1-2. - Automobile glare and highway visibility measurements, by Evan P. Bone, p. 3-13. - Discussion, by A. R. Lauer, R.P. Teele, E. P. Bone, p. 13-20. - Reflex reflector performance criteria, by D. M. Finch, p. 21-40. - Photometric tests for reflective materials, by B.W. Pocock and C. C. Rhodes. p. 40-54.

REPORT OF THE CONFERENCE ON HEARING AND VOICE COMMUNICATION, NATIONAL ACADEMY OF SCIENCES, WASHINGTON, D. C. 28 OCTOBER 1950 UNDER THE AUSPICES OF THE ADVISORY PANEL FOR PSYCHOPHYSIOLOGY, PSYCHOPHYSIOLOGY BRANCH, HUMAN RESOURCES DIVISION. U. S. Office of Naval Research. Psychophysiological Branch. Oct 1950. 27p Mi $2.00, Ph $3.75. PB 103870

1. Psychoacoustics 2. Psychological research 3. Communications, Auditory 4. Communications, Visual 5. National Academy of Sciences, Washington, D. C.

Dr. Hallowell Davis, Chairman.

STROKE AMPLITUDE AS A FUNCTION OF AIR DENSITY IN THE FLIGHT OF DROSOPHILA, by Leigh E. Chadwick. U. S. Chemical Corps. Medical Division. Army Chemical Center, Md. Mar 1951. 20p photos, diagrs, drawings, tables Mi $1.75, Ph $2.50. PB 103873

1. Drosophila virilis 2. Air pressure - Effects on insects 3. Insects - Effects of air pressure 4. CC MD RR 47.

Project no.: 4-65-02-001. Test program no.: T9. CMLEM-52.

STUDIES ON AUDIOGENIC SEIZURES IN LABORATORY MICE, by Hubert Frings and Mable Frings. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1950. 16p tables Mi $1.75, Ph $2.50. PB 103812

1. Sound - Physiological effects 2. Noise - Physiological effects 3. Mice - Auditory stress 4. Pennsylvania State College, State College, Pa 5. AAF TR 6369.

Contract no. AF 33(038)-786.

STUDY OF VOCAL RESPONSES DURING CONTROLLED AURAL STIMULATION, by Chester J. Atkinson. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla. Dec 1950. 24p diagr, graphs, tables Mi $2.00, Ph $3.75. PB 104635

1. Speech - Effect of acoustics 2. Controls, Acoustic 3. Acoustic research 4. Ohio State University Research Foundation, Cleveland, Ohio 5. NMRI Proj NM001064.01.05 R5.

Joint project report no. 5, Ohio State University

Research Foundation, Columbus, Ohio, under Contract N6onr-22525, project designation NR142-992, and U. S. Naval School of Aviation Medicine, Bureau of Medicine and Surgery project NM001064.01.05.

SUMMARY REPORT ON THE TOXICITY OF THE OXIDES FROM RED FUMING NITRIC ACID, by Edward LeB. Gray, James K. MacNamee and Stanley B. Goldberg. U. S. Chemical Corps. Medical Division. Army Chemical Center, Md. Apr 1951. 15p tables Mi $1.75, Ph $2.50. PB 103874

1. Nitric acid, Red fuming - Physiological effects 2. Nitrogen oxides - Physiological effects 3. Animals - Effect of nitrogen oxides 4. CC MD RR 52.

CMLEM-52. Chemical Corps Project no. 4-61-14-002, Health hazards of military chemicals.

SURVEY OF PSYCHOLOGICAL PROBLEMS AND SERVICES IN NAVAL AVIATION, by William McGehee, with an introduction, by Morris S. Viteles. National Research Council. Committee on Aviation Psychology. Jun 1951. 40p table Mi $2.25, Ph $5.00. PB 104621

1, Psychological research 2. Psychology, Aviation 3. U. S. Bureau of Medicine and Surgery. Division of Aviation Medicine. 4. NRC CAP no. 12.

Contract N7onr-291, Task order IX.

METALS AND METAL PRODUCTS

AIRCRAFT MATERIAL SPECIFICATION: 2 1/2 PER CENT NICKEL-CHROMIUM-MOLYBDENUM STEEL TUBES (75 TONS). Gt. Brit. Ministry of Supply. Dec 1950. 2p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.15. PB 104591

1. Aircraft - Materials - Specifications - Gt. Brit. 2. Tubes, Steel - Standards - Gt. Brit. 3. Tubes, Nickel-chromium-molybdenum alloy - Gt. Brit. 4. MS DTD MS 713.

APPARATUS FOR THE PRODUCTION OF SINGLE CRYSTALS OF MAGNESIUM AND ITS SOLID SOLUTION ALLOYS, by Franklin Joseph Gillig. Jan 1950. 78p photos, diagrs Mi $3.50, Ph $10.00. PB 104511

The details of construction and operation are described of an apparatus developed for the production of single crystals of magnesium and its solid solution alloys as well as single crystals of other metals of lower melting point. The apparatus is based on the operating principle of a moving temperature gradient within the furnace while both the mold and furnace remain fixed. The control system provides extreme flexibility and allows setting up a wide range of temperature gradients and travel speeds along the length of the furnace. The equipment can also be used with the strain-anneal method of growing single crystals. The apparatus is described in a manner so as to make duplication as easy as possible. Recommendations are made for means of improvement to be incorporated in duplicate models. Thesis-Rensselaer Polytechnic Institute.

BEHAVIOR OF MATERIALS UNDER REPEATED STRESS. TWELFTH PROGRESS REPORT: EXPERIMENTAL STUDY OF THE EFFECT OF THERMAL ACTIVATION ON THE FATIGUE LIFE OF 75S-T ALUMINUM ALLOY, by C. S. Yen and T. J. Dolan. Illinois. Engineering Experiment Station, Urbana, Ill. Oct 1949. 25p graphs, tables Mi $2.00, Ph $3.75. PB 104458

An experimental study was made to determine the effect of thermal activation on the fatigue life of 75 S-T aluminum alloy. The behavior of the alloy was similar to that of copper; intermittent resting at 225°F for 20 minutes or at 70°F for 24 hours did not increase, but sometimes slightly decreased, the average fatigue life of the specimens. It was found that the use of log N, where N is the number of cycles of loading for failure, resulted in a better correlation than the number N in the presentation of the frequency distribution for fatigue life. The S-log N curve and the log S-log N curve were concave upward, rather than straight lines. The scatter band for an average S-log N curve was not constant for different stress levels; the higher the stress level the narrower the scatter band. Contract N6-ori-71, Task order IV; Project Nr-031-005. Supplement to 8th progress report on this contract. See also PB 104494.

BEHAVIOR OF MATERIALS UNDER REPEATED STRESS. TECHNICAL REPORT 15: INFLUENCE OF AUSTENITIC GRAIN SIZE AND METALLURGICAL STRUCTURE ON THE MECHANICAL PROPERTIES OF STEEL, by G. M. Sinclair and T. J. Dolan. Illinois. University. Dept. of Theoretical and Applied Mechanics, Urbana, Ill. Dec 1949. 69p photos, graphs, tables Mi $3.00, Ph $8.75. PB 104494

An investigation was made to determine the effects of a large increase in prior austenitic grain size on the mechanical properties of AISI and SAE 1045, SAE 2340, and SAE 3140 steels. The steels were heat treated to produce a microstructure which was mainly tempered martensite or consisted largely of pearlite and ferrite. For the microstructure of tempered martensite, an increase in the prior austenitic grain size slightly decreased the percentage elongation obtained in static tension tests but did not appreciably affect the yield, tensile, or fatigue strength values. In the transition temperature range, the energy absorbed by V-notch Charpy impact specimens was somewhat greater for coarse-grained steels. For a microstructure essentially of pearlite, a large increase in the prior austenitic grain size reduced ductility and the energy absorbed in V-notch Charpy impact tests. Contract no. N6ori-71. Project Nr-031-005, Technical report no. 15. See also PB 104458

BENEFICATION OF JAPANESE ORES, by William E. Caldwell. Supreme Commander for the Allied Powers. Natural Resources Section. Aug 1951. 23p map, tables Mi $2.00, Ph $3.75. PB 104798

1. Ore - Processing - Japan 2. SCAP NRS PS 63.

CATHODIC PROTECTION OF METALS IN ICE PLANTS, by Robert W. Warner and A.J. McCrocklin, Jr. Texas University. Bureau of Engineering Research. Jan 1943. 29p diagrs, graphs Available from Bureau of Engineering Research, University of Texas, Austin, Tex. PB 104496

1. Ice plants 2. Metals - Corrosion prevention 3. TU ERS 36.

University of Texas publication no. 4303.

CRITICAL REVIEW OF NOTCH SENSITIVITY IN STRESS-RUPTURE TESTS, by W. F. Brown, Jr. and George Sachs. U. S. National Advisory Committee for Aeronautics. Aug 1951. 29p diagrs, graphs Mi $2.00, Ph $3.75. PB 104806

A critical review of the English and German literature on notch rupture testing was made to establish the influence of notching on various heat-treated steels and several nonferrous alloys when subjected to long-time loading at elevated temperatures. A correlation between rupture ductility and notch sensitivity is established for low-alloy steels. Notch rupture data are compared with data obtained at room temperature to reveal the general effects of notch geometry. Notch embrittlement observed for low-alloy steels in rupture tests is discussed with regard to a precipitation reaction and is correlated with the composition and heat treatment. NACA TN 2433.

DEVELOPMENT OF TITANIUM-BASE ALLOYS AND PROCESSES FOR THEIR COMMERCIAL PRODUCTION. BIMONTHLY PROGRESS REPORT FOR JANUARY AND FEBRUARY, 1949 ON CONTRACT NO. 33-038-AC-21229, by O. W. Simmons, C. T. Greenidge, C. M. Craighead, F. Fawn, L. W. Eastwood, M. W. Mallett and E. J. Center. Battelle Memorial Institute, Columbus, Ohio. Feb 1949. 68p graphs, tables (6 fold) Mi $3.00, Ph $8.75. PB 104459

Progress made in the development of titanium-base alloys and processes for commercial production is reported. Titanium-base alloys with additions of copper, iron, lead, manganese, nickel, vanadium, and chromium, and alloys with copper, iron, manganese, vanadium, and chromium containing 0.25% carbon were investigated. The addition of carbon resulted in grain refinement. The solution heat treatment of these alloys at temperatures from 1450° to 1750° was studied by means of changes in hardness. While the tensile strength was increased in some alloys after heat treatment of 1600°F, the ductility was generally reduced. The alloys were subjected to aging treatment at 752°F. From consideration of the mechanical properties, alloys containing 2.5 to 5.0% chromium appear to be of interest. The step-wise thermal reduction of titanium tetrachloride in the presence of hydrogen is under investigation. See also PB 104460. Paging numbered from p. 105 to p. 152. Contents: - Melting of experimental titanium-base alloys, by O. W. Simmons and C. T. Greenidge. p. 108-111. - Evaluation of experimental titanium-base alloys, by C. M. Craighead, F. Fawn and L. W. Eastwood. p. 112-149. - Chemical analysis of titanium-base alloys, by M. W. Mallett and E. J. Center. p. 149-152.

DEVELOPMENT OF TITANIUM-BASE ALLOYS AND PROCESSES FOR THEIR COMMERCIAL PRODUCTION. BIMONTHLY PROGRESS REPORT FOR MARCH AND APRIL, 1949 ON CONTRACT NO. W33-038-AC-21229, by O. W. Simmons, C. T. Greenidge, C. M. Craighead, F. Fawn, L. W. Eastwood, R. J. Lockhart, J. W. Clegg, E. J. Center and M. W. Mallett. Battelle Memorial Institute, Columbus, Ohio. Apr 1949. 42p graphs, tables Mi $2.50, Ph $6.25. PB 104460

Progress made on the development of titanium-base alloys and processes for commercial production is outlined. The composition and properties of some of the alloys are described. Of the various binary alloys considered, the greatest increase in tensile strength was obtained with chromium. The addition of nitrogen in small amounts causes a marked increase in strength. In the as-hot-rolled temper, a tensile strength of 186,000 psi with 6.0% elongation in 1 in., and a bend ductility greater than 4 t were obtained with a binary chromium alloy having a nominal composition of 5% chromium. Alloys of 5% chromium, 0.25% carbon, and 2.0% manganese or iron had higher tensile strength and less elongation. An extensive series of age-hardening tests was conducted with selected compositions. The results of other studies on compositions and processes are described. See also PB 104459. Paging numbered from p. 153 to p. 198. Contents: - Experimental work: Melting of experimental titanium-base alloys, by O. W. Simmons and C. T. Greenidge. p. 156-158. - Evaluation of experimental titanium-base alloys, C. M. Craighead, F. Fawn and L. W. Eastwood. p. 158-194. - Vapor-phase reduction of titanium tetrachloride by hydrogen, by R. J. Lockhart and J. W. Clegg. p. 195. - Chemical analysis of titanium-base alloys, by E. J. Center. p. 195-196. - Determination of oxygen in titanium by the chlorine-carbon tetrachloride method, by E. J. Center. p. 196. - Determination of oxygen in titanium by vacuum fusion, by M. W. Mallett. p. 197. - Determination of oxygen in titanium by use of O^{18} and the mass spectrograph, by M. W. Mallett, p. 197-198.

EFFECT OF ALLOYING ELEMENTS ON THE PLASTIC PROPERTIES OF ALUMINUM ALLOYS, by J. E. Dorn, P. Pietrokowsky and T. E. Tietz. Fifth technical report under Contract no. N7onr-295, Task order II, NR 031-048. California. University. Dept. of Engineering. Div. of Engineering Research. Aug 1949. 141p graphs, tables Mi $5.75, Ph $18.75. PB 104504

Four compositions each of high purity aluminum alloys, were investigated over a range of temperatures from liquid nitrogen to atmospheric temperature. The effect of each concentration of each alloying element could be correlated with the atomic percentage of Cu which would give the same stress-strain curve. It was shown that the plastic properties of aluminum alloys are functions of lattice strain and the change in the mean number of electrons per atom in solution. Excellent agreement was achieved between experimental data for solid solution strengthening and the factors of lattice strain and the change in electron concentration per atom of solution, assuming a valence of two for aluminum in the metallic state.

EINFLUSS DER OBERFLÄCHENRAUHIGKEIT AUF DIE BIEGEWECHSELFESTIGKEIT VON UNGEHÄRDTETEM UND VERGÜTETEM STAHL (EFFECT OF SURFACE ROUGHNESS ON THE ALTERNATING BENDING STRENGTH OF UNHARDENED AND TEMPERED STEEL), by H. Glaubitz. Sep 1949. 17p photos, diagr, graphs, tables Mi $1.75, Ph $2.50. PB 104675

1. Steel - Bending tests - Germany 2. Steel - Surfaces - Germany 3. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 4. DSIR SR 1.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 115.

ELEKTROLITICHESKOE POLUCHENIE I SVOISTVA ZHELEZNOGO POROSHKA (ELECTROLYTIC PREPARATION OF FERRIC POWDERS AND THEIR CHARACTERISTICS), by L. L. Kuzhmyn and V. A. Kiseleva. Mar 1949. 9p graphs, tables (Text in Russian) Mi $1.25, Ph $1.25. PB 104476

Tests made to determine the qualities of ferric powders produced by an electrolytic process show that the electrolytic method does not offer the possi-

bility of obtaining ferric powders with uniform grains because of the effect of variable current densities causing thick deposits around the cathode. Nevertheless, the degree of dispersion is in such stages where sufficient, high activity can be expected. In cases where the process of cathodic deposition of iron brings about the formation of a great number of hydrates, the powders obtained in the first batch do not show any measurable capacities and cannot be molded. Reprinted from Zhurnal prikladnoi khimii, t. XXII, no. 3, p. 311-318.

EVALUATION OF MECHANICAL PROPERTIES AND FOUNDRY CHARACTERISTICS OF MAGNESIUM-BASE CASTING ALLOYS RECOMMENDED FOR ELEVATED TEMPERATURE APPLICATIONS. FIRST MONTHLY PROGRESS REPORT ON CONTRACT NO. NOA(S)10576. Dow Chemical Co. Magnesium Laboratories, Midland, Mich. Jan 1950. 9p photos Mi $1.25, Ph $1.25. PB 104490

Progress is reported on studies of the evaluation of mechanical properties and foundry characteristics of three magnesium-base alloys recommended for applications at elevated temp. Comparison has been made of the castability of Battelle's modified EM61 alloy, British ZRE1, and Dow's EK30. Sand castings in the properly heat-treated condition are sectioned to compare tensile strengths at room temperature, 400° and 600°F, as well as creep resistance at 400° and 600°F. Report no. 15179. For 4th report see PB 104482; for first report see PB 103793.

EVALUATION OF MECHANICAL PROPERTIES AND FOUNDRY CHARACTERISTICS OF MAGNESIUM-BASE CASTING ALLOYS RECOMMENDED FOR ELEVATED TEMPERATURE APPLICATIONS. FOURTH MONTHLY PROGRESS REPORT ON CONTRACT NO. NOA(S)10576, MAR 17, 1950-APR 17, 1950. Dow Chemical Co. Magnesium Laboratories, Midland, Mich. Apr 1950. 30p photos, diagr, tables Mi $2.00, Ph $3.75. PB 104482

Progress is reported in the evaluation of mechanical properties and foundry characteristics of magnesium-base casting alloys. It was found that no difference exists in elevated temperature tensile properties of separately cast test bars of low tungsten EM61(s) alloy when heat treated at 1000° or 1040°F prior to aging. The average grain size of EK30 alloy is much finer than that of low tungsten EM61(s). Two castings, "Casting D" in EK30 alloy were sectioned, and room temperature, 400° and 600°F, tensile properties were obtained. The room temperature tensile properties of separately cast bars are somewhat better than those of bars machined from these castings. Report no. 15179. For 1st report see PB 104490; for final report see PB 103793.

EXPERIMENTAL DETERMINATION OF THE FATIGUE DIAGRAM FOR ALCLAD SHEET SPECIMENS WITH RIVET HOLES, SUBJECTED TO TENSION AND COMPRESSION, by G. Wallgren. Flygtekniska Försöksanstalten FFA, Stockholm. 1948. 13p diagr, graphs Mi $1.75, Ph $2.50. PB 104503t

The fatigue diagram for Alclad sheet specimens with rivet holes, subject to tension and compression was experimentally determined. The notch sensitivity of the material and the effect of surface finish on fatigue strength were studied. Results of static tests show that the ultimate stress of the specimens with holes, based on net area, is about 7% less than that of sheet without holes. Results of fatigue tests on the specimens with holes are given in the form of fatigue curves showing how the maximum cycle stress varies as a function of the number of cycles to failure, for different values of the mean cycle stress. The notch sensitivity and the effect of surface finish on the fatigue strength were calculated and plots are presented. Translation of PB 104503. Translated and distributed by the Royal Swedish Air Board as Translation no. 9.

EXPERIMENTELL BESTÄMNING AV UTMATTNINGS DIAGRAMMET FÖR NITHALSFÖRSEDDA PROVSTAVAR AV ALCLADPLAT VID DRAG-OCH TRYCKBELASTNING (EXPERIMENTAL DETERMINATION OF THE FATIGUE DIAGRAM FOR ALCLAD SHEET SPECIMENS WITH RIVET HOLES, SUBJECTED TO TENSION AND COMPRESSION), by G. Wallgren. Flygtekniska Försöksanstalten FFA, Stockholm. 1946. 15p diagr, graphs (Text in Swedish) Mi $1.75, Ph $2.50. PB 104503

1. Aluminum alloys - Fatigue tests 2. Sheel aluminum - Compression tests 3. Sheet aluminum - Tensile properties 4. FFA 14.

For English translation see PB 104503t.

FATIGUE STRENGTHS OF AIRCRAFT MATERIALS: AXIAL-LOAD FATIGUE TESTS ON NOTCHED SHEET SPECIMENS OF 24S-T3 AND 75S-T6 ALUMINUM ALLOYS AND OF SAE 4130 STEEL WITH STRESS-CONCENTRATION FACTORS OF 2.0 AND 4.0, by H. J. Grover, S. M. Bishop and L.R. Jackson. U. S. National Advisory Committee for Aeronautics. Jun 1951. 61p photos, drawings, graphs, tables Mi $3.00, Ph $8.75. PB 104249

Presents results of axial-load fatigue tests on notched specimens of 24S-T3 and 75S-T6 aluminum alloys and normalized SAE 4130 steel with stress-concentration factors of 2.0 (central circular hole, symmetrical edge notches, and fillets) and 4.0 (symmetrical edge notches and fillets). Fatigue tests were run at several levels of nominal mean stress. Results are compared with previous data for unnotched specimens. NACA TN 2389.

FATIGUE STRENGTH OF AIRCRAFT MATERIALS: AXIAL-LOAD FATIGUE TESTS ON NOTCHED SHEET SPECIMENS OF 24S-T3 AND 75S-T6 ALUMINUM ALLOYS AND OF SAE 4130 WITH STRESS-CONCENTRATION FACTOR OF 5.0, by H. J. Grover, S. M. Bishop and L. R. Jackson. U. S. National Advisory Committee for Aeronautics. Jun 1951. 19p diagrs, graphs, tables Mi $1.75, Ph $2.50. PB 104241

Results are given of axial-load fatigue tests on notched specimens of 24S-T3 and 75S-T6 aluminum alloys and of normalized SAE 4130 steel. Each specimen was notched by edge notches designed to have a theoretical stress-concentration factor of 5.0. Tests were run at nominal mean stresses of 0, 10,000, 20,000 and 30,000 psi. Results extend previously reported data on unnotched specimens and specimens less severely notched. NACA TN 2390.

IMPORTANT GOLD-SILVER MINES OF JAPAN, by Robert Y. Grant. Supreme Commander for the Allied Powers, Natural Resources Section. Aug 1951. 125p maps, fold diagrs, tables Mi $5.00, Ph $16.25. PB 104867

1. Gold mines and mining - Japan 2. Silver mines and mining - Japan 3. SCAP NRS 144.

INVESTIGATION OF THE MICROCONSTITUENTS IN CHROMIUM-BASE, CHROMIUM-IRON-MOLYBDENUM ALLOYS AND THEIR BEHAVIOR WITH HEAT TREATMENT, by Joseph P. Hammond. 1949. 147f graphs, tables Mi $5.75, Enl Pr $20.00. PB 104478

Studies were made of the microconstituents in chromium-base, chromium-iron-molybdenum alloys and their behavior with heat treatment. These chromium-base heat-resistant alloys show superiority in strength and oxidation resistance over cobalt-base and other commercially used high-temperature alloys. Phases occurring in the 60Cr-15Fe-25Mo and 60Cr-25Fe-15Mo type alloys were distinguished by the metallographic etchants and verified by X-ray techniques. The upper temperature limit for formation of the finely dispersed constituent in the 60Cr-15Fe-25Mo type alloy upon aging is 1800°F, and in the 60-CR-25Fe-15Mo type alloy is 1600°F. Homogenization treatments prior to aging show merit in increasing the hardness of chromium-base alloys. Homogenizing also appears to be of value in improving creep and rupture properties of chromium-base alloys. Thesis-Yale University.

LITHIUM TUNGSTEN BRONZES, by Shun Sheng Hsu. 1949. 57p photos, diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 104515

An investigation was made to determine the structural properties of lithium tungsten bronzes, to determine the solubility of tungstic oxide in the bronzes, and to find the lattice changes with increasing amount of WO_3 in such a solid solution series. The lithium tungsten bronzes were prepared by reducing lithium tungstate and tungstic oxide with metallic tungsten at 800°C in vacuum. The bronze containing the least amount of WO_3 in solid solution has the approximate formula of $LiWO_3$. Metallic lithium reacts violently with tungstic oxide, and cannot be used to prepare $Li WO_3$, but WO_3 can absorb Li vapor from lithium tungsten bronze at high temperature in vacuum. It was found that the Li-W bronzes have a simple cubic crystal structure. The lattice of the lithium tungsten bronze expands with the increasing solid solubility of WO_3. Thesis-School of Mines and Metallurgy, University of Missouri.

MANUFACTURE OF TITANIUM ALLOYS. PROGRESS REPORT NO. 2 FOR JAN AND FEB 1950 UNDER NAVY CONTRACT NO. NOA(S)-10683, by R. H. Dickinson, R. H. Freyer and Lee S. Busch. Mallory, P. R., & Co., Inc., Indianapolis, Ind. Apr 1950. 53p photos, graphs, tables Mi $2.75, Ph $7.50. PB 104518

Progress made in an investigation of titanium alloys is outlined. Work on 3% Al - 5% Cr - titanium alloys containing carbon was continued. The additions of 1% Si and 1% B to the Al - Cr - Ti alloy were made to improve physical properties. Microstructures are presented which show the beta to alpha phase transformation temperature range to be from over 1025°C to below 700°C. Al - Cr - Zr, Cr - Zr, Fe, Fe - Va, W and Be alloys of titanium have been produced. Physical property data and heat treatments of these alloys, with the exception of the Be alloys, have been investigated. The tensile properties of these alloys are from 108,000 psi with 10% elongation to 214,000 psi with 3.9% elongation. Memo no. 8000-M-474. For final report see PB 102870.

MECHANISTIC MODEL FOR THE MAGNETIZATION OF IRON, A MODEL AND EMPIRICAL EQUATIONS FOR THE MAGNETIC PROPERTIES OF IRON INCLUDING SATURATION AND HYSTERESIS, by William Schroeder. Idaho. Engineering Experiment Station, Moscow, Idaho. Jul 1940. 23p diagrs, graphs, tables Available from University of Idaho, Engineering Experiment Station, Moscow, Idaho. PB 104609

1. Iron - Magnetic properties 2. ID EES B5. University of Idaho bulletin, vol. XXXV, no. 10.

METALLURGICAL EXAMINATION OF SAMPLES FROM SNJ WING PANELS NOS. 1014-36 AND 1014-37, by J. Viglione. U. S. Naval Air Material Center. Aeronautical Materials Laboratory, Philadelphia, Pa. May 1950. 22p graphs, tables Mi $2.00, Ph $3.75. PB 104480

Metallurgical examinations were conducted on samples of service-stressed FS-1h magnesium alloy removed from various locations on the wing panels of an SNJ trainer. Test results show that there was little noticeable change in the tensile, compressive, and hardness properties of the service-stressed alloy as compared to the unstressed virgin alloy. However endurance test results indicate approximate reductions of from 12 to 28% in the endurance strength of removed skin samples, with the greatest reduction taking place in the samples removed from the areas of the wing panels where failure occurred during static testing. The test data were found to be highly consistent with previous test data, which were obtained during a similar type investigation conducted on J1h magnesium alloy removed from other SNJ wing panels. NAM AML 411026 pt. III.

MONTHLY TECHNICAL PROGRESS REPORT FOR PERIOD ENDING JAN 31, 1950 UNDER CONTRACT NO. NOA(S)-9478, by L. Owen, Jr., F.G. Sorrentino, Ralph Wehrmann. Fansteel Metallurgical Corp., Chicago, Ill. Jan 1950. 8p Mi $1.25, Ph $1.25. PB 104492

The development of coatings for molybdenum and preparation of molybdenum-silicon alloys are discussed. Twenty molybdenum specimens were coated with both silicon and boron by vapor-phase reduction of the respective chlorides. The coatings containing less than 10% boron were superior to "straight" silicon coatings, and the average life was increased. The maximum life of specimens painted with fluxed silicon powder and sintered has been increased to 10 hr at 1650°C. Small percentages of iron increase thermal shock resistance, but lower the life span of the coating. Three pressed and sintered bars of MoSi alloy containing 5% Fe by weight were in a satisfactory condition after 912 hr at 1370°C. The preparation of rods by cold extrusion followed by sintering have been unsuccessful because the road were heated too fast during the initial stages of the sintering operation.

NOTE ON THE TENSILE STRENGTH AND ELONGATION OF WIDE PLATES OF ALUMINUM ALLOY WITH AND WITHOUT HOLES, by H. E. Smith and H. L. Cox. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1944. 8p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104324

The presence of the hole reduces the tensile strength of the sheet in the transverse section through the hole only slightly, and the reduction is not appreciably affected by reinforcing the hole. Reinforcement has however a considerable effect in reducing the cross buckling of the sheet above and below the hole under the compressive stress developed in these regions, and in this respect pressed flanges are not inferior to stiffening rings. The behaviour of wide plates under static tension does not differ materially from the behaviour of the usual narrow test pieces. Cover date is 1951. S. O. Code no. 23-2429. ARC RM 2429.

PLASTIC STRESS-STRAIN RELATIONS FOR 75S-T6 ALUMINUM ALLOY SUBJECTED TO BIAXIAL TENSILE STRESSES, by Joseph Marin, B. H. Ulrich and W. P. Hughes. U. S. National Advisory Committee for Aeronautics. Aug 1951. 48p photos, drawing, graphs, tables Mi $2.50, Ph $6.25. PB 104860

Constant-stress-ratio tests, variable-stress ratio tests, and special tests were made on a tubular 75S-T6 aluminum-alloy specimen. The stresses used were essentially biaxial and tensile stresses. The constant-stress-ratio test result gave control data and showed the influence of biaxial stresses on the yield, fracture, and ultimate strength of the material. It is possible to determine from certain variable-stress-ratio tests whether there is any significant difference between the flow and deformation type of theory. The special tests checked specific assumptions made in the theories of plastic flow. NACA TN 2424.

PREPARATION AND EVALUATION OF TITANIUM ALLOYS. SUMMARY REPORT, PART III COVERING THE PERIOD MAY 18, 1948 TO JULY 30, 1949 UNDER CONTRACT W33-038-AC-21229, by C. H. Craighead, O. W. Simmons, P. J. Maddox, C. T. Greenidge, and L. M. Eastwood. Battelle Memorial Institute, Columbus, Ohio. Jul 1949. 536f graphs, tables Mi $9.00, Enl Pr $71.25. PB 104457

Part III of a report on preparation and evaluation of titanium alloys gives a number of analytical methods, and discusses refractories for titanium. The effects of various factors on the results of the evaluation of the alloys are outlined. Results are given of bend, tensile and hardness tests, and of tests made after heat treatment. Techniques for melting titanium alloys are described and a discussion is given of binary, ternary and quaternary titanium alloys. A detailed account is given of the analytical methods for lead, manganese, tin, cobalt, silver, molybdenum, nickel, vanadium, and copper. Results obtained on the development of analytical methods for oxygen are discussed.

PREPARATION OF COPPER SINGLE CRYSTALS BY MEANS OF POWDER METALLURGY METHODS, by Wei-Kung Chang. Jul 1949. 65p photos, graphs, tables Mi $3.00, Ph $8.75. PB 104516

The possibilities of preparing single crystals from copper powder by employing the powder metallurgy technique were investigated. Three separate experiments were made, employing compressed copper powder flats, copper wire, and compressed copper powder tensile bars, respectively. Results proved that it is quite feasible to prepare the single crystals from copper powder by powder metallurgy method followed by compression, sintering, deformation, elongation or compression, and annealing. Best temperature for the grain growth of copper powder compacts during sintering or annealing was found to be 950°C, while best compressing pressure for the grain growth falls within range of from 8 to 12 tores per sq in. The process of recrystallization and grain growth in the copper wire and copper powder compounds appears to be similar. Thesis-School of Mines and Metallurgy, University of Missouri.

PROPERTIES OF SOME ALUMINUM ALLOYS AT ELEVATED TEMPERATURES, by G. Meikle, M. S. Binning and M. E. Wright. Gt. Brit. Royal Aircraft Establishment, Farnborough, Eng. Nov 1948-Feb 1950. 63p graphs, tables Mi $3.00, Ph $8.75. PB 104493

The properties of some aluminum alloys at elevated temperature were investigated under tensile loading. The method of testing the materials in tension at elevated temperatures required the test piece to be raised to the testing temperature in 60 min ± 10 min and held at the temperature for 60 min before testing. It was concluded that aluminum-copper alloys (Duralumin, D.T.D.130, L42 and D.T.D. 364) when heated over 150°C show a progressive loss in strength depending on the length of time the alloy is exposed to the elevated temperature. Aluminum-zinc-magnesium alloys (D.T.D. 683 and D.T.D. 363A) show a similar effect which begins at a lower temperature, of the order of 120°C. Tech. note Met. 96 and addendum. Addendum is Tensile properties of two aluminum alloys at elevated temperatures, by G. Meikle and M. E. Whillans.

RESEARCH AND DEVELOPMENT ON THE PHASE DIAGRAMS OF THE TI-MO, TI-CB, AND TI-SI ALLOY SYSTEMS. REPORT NO. 2. JAN 1-FEB 28, 1950, by Harold D. Kessler and M. Hansen. Armour Research Foundation, Chicago, Ill. Mar 1950. 16p photos Mi $1.75, Ph $2.50. PB 104572

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-columbium alloys 4. Titanium-molybdenum alloys 5. Titanium-silicon alloys 6. ARF Project 90-773B, Report no. 2.
Contract no. AF 33(038)-8708.

RESEARCH AND DEVELOPMENT ON THE PHASE DIAGRAMS OF THE TI-MO, TI-CB, AND TI-SI ALLOY SYSTEMS. REPORT NO. 3, MAR 1-APR 30, 1950, by Harold D. Kessler and M. Hansen. Armour Research Foundation; Chicago, Ill. May 1950. 55p photos, graphs Mi $2.75, Ph $7.50. PB 104573

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-columbium alloys 4. Titanium-molybdenum alloys 5. Titanium-silicon alloy 6. ARF Project 90-773B, Report no. 3.
Contract no. AF 33 (038)-8708.

RESEARCH AND DEVELOPMENT ON THE PHASE DIAGRAMS OF THE TI-MO, TI-CB, AND TI-SI ALLOY SYSTEMS. REPORT NO. 4, MAY 1-JUNE 30, 1950, by Harold D. Kessler and M. Hansen. Armour Research Foundation, Chicago, Ill. Jul 1950. 27p photos, tables Mi $2.00, Ph $3.75. PB 104574

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-columbium alloys 4. Titanium-molybdenum alloys 5. Titanium-silicon alloys 6. ARF Project 90-773B, Report no. 4.
Contract no. AF 33(038)-8708.

RESEARCH AND DEVELOPMENT ON THE PHASE DIAGRAMS OF THE TI-MO, TI-CB, AND TI-SI ALLOY SYSTEMS. REPORT NO. 5, JULY 1-AUG 30, 1950, by Harold D. Kessler and M. Hansen. Armour Research Foundation, Chicago, Ill. Sep 1950. 53p drawings, graphs Mi $2.75, Ph $7.50. PB 104575

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-columbium alloys 4. Titanium molybdenum alloys 5. Titanium-silicon alloys 6. ARF Project 90-773B, Report no. 5. Contract no. AF 33(038)-8708.

RESEARCH AND DEVELOPMENT ON TITANIUM ALLOYS. SECOND PROGRESS REPORT COVERING THE PERIOD SEP 1 TO OCT 31, 1949 ON CONTRACT NO. AF 33(038)-3736. Battelle Memorial Institute, Columbus, Ohio. Oct 1949. 80p photos, drawings, graphs, tables (part fold) Mi $3.50, Ph $10.00. PB 104641

Progress is reported in development of titanium alloys. Phase relations in titanium - 0 to 1% germanium and titanium-0 to 10% nickel alloys were investigated. Nickel was found to limit markedly the alpha-phase field and to lower the beta solvus line. The range of compositions investigated in the binary titanium-silver systems was extended to 5% silver, and titanium-beryllium alloys containing 0.1 to 1% beryllium were investigated. Additions of 1 and 2% columbium or tantalum to Process A metal increased the tensile strength and lowered the ductility of Process A titanium. Ternary alloys of managese and carbon, manganese and vanadium, and molybdenum and tungsten, prepared by adding the pure metals during arc melting, had quite erratic tensile properties when tested after fabrication to sheet. Tests were completed on evaluation of "hot-pressed" titanium carbide and graphite crucibles. For 1st report see PB 104429; for 3d report see PB 104461, for 4th report see PB 104673. Contents: Summary. - Arc melting titanium-base alloys, by O. W. Simmons and C. T. Greenidge. - Evaluation of experimental titanium-base alloys, by C. M. Craighead, F. Fawn and L. W. Eastwood. - Investigation of refractories for melting titanium, by P. D. Maddex and L. W. Eastwood. The Derge method of analyzing for oxygen in titanium by vacuum fusion, by M. W. Mallett.

RESEARCH AND DEVELOPMENT ON TITANIUM ALLOYS. THIRD PROGRESS REPORT COVERING THE PERIOD NOVEMBER 1 TO DECEMBER 31, 1949 ON CONTRACT NO. AF 33(038)-3736, by O. W. Simmons, C. T. Greenidge, C. M. Craighead, F. Fawn, L. W. Eastwood and P. J. Maddex. Battelle Memorial Institute, Columbus, Ohio. Dec 1949. 59p graphs, tables (9 fold) Mi $2.75, Ph $7.50. PB 104461

Progress is reported in the development of titanium alloys. An investigation was made of the phase relations in ternary titanium-molybdenum alloys containing additions of carbon, copper, chromium, manganese, iron, cobalt, or nickel, and in ternary titanium-manganese alloys containing additions of nitrogen, copper, molybdenum, or cobalt. The effects of the properties produced by the combined additions of carbon and nitrogen in titanium-manganese and titanium-molybdenum base were also investigated. A melting technique was developed which assures greater uniformity in 0.5-lb ingots. Tests were completed on the evaluation of silicon carbide (Crystolon) and silicide coating on tungsten, tantalum, and molybdenum crucibles. A hot-pressed ZrO_2 crucible that has been prefired at 1400°F to oxidize any surface carbon was also tested. Contents: - Arc melting titanium-base alloys, by O.W. Simmons and C. T. Greenidge. p. 123-124. - Evaluation of experimental titanium-base alloys, by C. M. Craighead, F. Fawn and L. W. Eastwood. p. 125-163. - Investigation of refractories for melting titanium, by P.J. Maddex and L. W. Eastwood. p. 163-169.

STUDIES OF A COMPRESSIBILITY TEST FOR METAL POWDERS, by Waldon E. Kiesshauer. Jan 1950. 35p graphs, tables Mi $2.25, Ph $5.00. PB 104495

A study was made of the influence of several variables which affect the reproducibility of a compressibility test for metal powders. A solution of stearic acid in acetone was used as a die wall lubricant and Swedish sponge iron was the test powder. The method of applying the lubricant was investigated, which indicated that filling the die with the lubricating solution and immediately emptying it was the best method. A concentration of 80 g stearic acid per liter of acetone gave higher compressibilities and better reproducibility than other concentrations. A higher average density was obtained by compacting the powder immediately after applying the lubricant. Forty-six samples were compacted under rigidly controlled conditions in a highly polished die. Compacting pressures were found to affect densities. Compressibility tests were also made in a die with deep scratches and in a badly worn die. Thesis-Rensselaer Polytechnic Institute.

STUDY OF THE ANOMALY IN THE RESISTIVITY-TEMPERATURE RELATIONSHIP OF NICKEL-CHROMIUM ALLOYS, by Mario Silvestrone. Jan 1950. 45p diagrs, graphs Mi $2.50, Ph $6.25. PB 104513

An x-ray diffraction study was made to determine whether a phase or structure change could be correlated with the anomaly which arises in the resistivity-temperature relationship of Ni-Cr alloys. The properties of Nichrome V (approx 80 weight percent Ni and 20 weight percent Cr, with small amounts of other elements), were determined in the temperature range 400° to 800°C. A definite change in lattice parameter was found, closely paralleling the change in resistivity with temperature. This evidence, together with the results of other studies on Nichrome V, appears to indicate that a short range ordering phenomenon is taking place. This phenomenon can also explain the lower resistivity of the hard wire compared with the soft wire at temperatures below 500°C. Thesis-Rensselaer Polytechnic Institute. Title page illegible.

TEMPERATURE DISTRIBUTION DURING ELECTRICAL RESISTANCE SINTERING OF POWDER METAL COMPACTS, by David A. Vermilyea. Jan 1950. 68p photos, diagrs, graphs, tables Mi $3.00, Ph $8.75. PB 104143

A method for measuring the temperature distribution in compacts sintered by the short time passage of high electric current is proposed. The method consists of imbedding wires of different melting points in the powder during compaction, examining the compact microscopically after sintering for evidence of the melting of the wire, and taking the melting point of the wire as the temperature indication. The possibility of altering the temperature distribution by means of shaped wafers or partially insulated wafers was considered and some experimental results are pre-

sented. It was found that it was possible to alter the temperature distribution to a very great extent. Some observations of alloying during sintering were made. The method was applied to brass compacts and compacts made from Buel and Plast iron powder. Thesis-Rensselaer Polytechnic Institute.

TITANIUM PHASE DIAGRAMS. REPORT NO. 8: PHASE DIAGRAMS OF THE TITANIUM-ALUMINUM, TITANIUM-CHROMIUM-IRON, AND TITANIUM-OXYGEN ALLOY SYSTEMS, JAN 16-MAR 15, 1951, by Harold D. Kessler, M. Hansen, R. A. Lubker. Armour Research Foundation, Chicago, Ill. Apr 1951. 28p photos, graphs, tables Mi $2.00, Ph $3.75. PB 104622

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-aluminum alloys 4. Titanium-chromium iron alloys 5. Titanium-oxygen alloys 6. ARF Project 90-773B, Report no. 8. Contract no. AF 33(038)-8708.

WARMWALZVERSUCHE AN EIN-UND ZWEISEITIG PLATTIERTEN STAHL (HOT-ROLLING EXPERIMENTS ON STEEL CLADDED ON ONE AND ON TWO SIDES) BY ANTON POMP AND WERNER LUEG. KALTWALZVERSUCHE MIT NICKEL-, KUPFER- UND MESSINGPLATTIERTEN STAHL (COLD-ROLLING EXPERIMENTS ON STEEL CLADDED WITH NICKEL, COPPER AND BRASS) by Anton Pomp and Georg Weddige. Kaiser Wilhelm Institut für Eisenforschung, Düsseldorf, Ger. 1938-1942. 29f photos, graphs, tables (Text in German) Mi $2.00, Enl Pr $5.00. PB 104356

1. Cladding - Germany 2. Steel, Clad - Rolling - Germany 3. Steel - Plating, Brass - Germany 4. Steel - Plating, Copper - Germany 5. Steel - Plating, Nickel - Germany 6. Micro BIOS DOCS 2174/1528/4-5 7. Micro BIOS FD 1283/47, Frames 42-53 8. Micro BIOS FD 1283/47, Frames 122-137.

English abstract included. Abstract available as PB 104356s. 2p. Mi $1.25, Ph $1.25.

METEORALOGY AND CLIMATOLOGY

ANALYSIS OF THE AUDIO-FREQUENCY FLUCTUATIONS IN RADAR STORM ECHOES: A KEY TO THE RELATIVE VELOCITIES OF THE PRECIPITATION PARTICLES, by Glenn R. Hilst. Massachusetts Institute of Technology. Dept. of Meteorology. Nov 1949. 85p diagrs, graphs Mi $3.75, Ph $11.25. PB 104720

1. Radar - Signals - Fluctuations 2. Rasaph (Radar signal spectrograph) 3. Rain and rainfall - Velocity 4. SIG Contract W36-039-sc-32038, Report no. 9A.

Dept. of the Army project: 3-99-05-022. Signal Corps project: 122B-O. Weather Radar research. Technical report no. 9, pt. A.

PROJECT CIRRUS. OCCASIONAL REPORT NO. 28: CONCENTRATION OF ICE CRYSTAL NUCLEI UNDER VARIOUS WEATHER CONDITIONS, by W. E. Hubert and J. J. Wells. General Electric Co., Research Laboratory, Schenectady, N. Y. Jun 1951. 24p diagrs, graph, tables Mi $2.00, Ph $3.75. PB 104809

1. Ice formation 2. GE RL 541 3. SIG Contract W-36-039-sc-38141.

Eighteenth occasional report under Contract no. W-36-039-sc-38141. Dept. of the Army project: 3-99-07-022. Signal Corps project: 172B.

VERTICAL RECORDING OF RAIN BY RADAR, by Sven K. H. Forsgren and Olof F. Perers. Chalmers University of Technology, Gothenburg, Sweden. 1951. 20p photos, graphs Mi $1.75, Ph $2.50. PB 104705

1. Radar, Meteorological - Sweden 2. Rain and rainfall - Measurements - Sweden 3. Chalmers University of Technology, Gothenburg, Sweden. Transactions nr. 107 4. Chalmers University of Technology, Gothenburg, Sweden. Research Laboratory of Electronics. Report no. 20.

Transactions of Chalmers University of Technology nr. 107. Reports from the Research Laboratory of Electronics no. 20.

MINERALS AND MINERAL PRODUCTS

CERAMIC EDUCATION, PAST, PRESENT AND FUTURE: SYMPOSIUM HELD AT ALFRED UNIVERSITY ON JUNE 12, 1950. New York State College of Ceramics, Alfred, N. Y. 1951. 64p photos, table Available from New York State College of Ceramics, Alfred University, Alfred, N. Y. PB 104005

Contents: Foreword by S. R. Scholes and J. F. McMahon. p. 3. - The panel. p. 6-10. - Development of ceramic education, by Lawrence E. Barringer. p. 11-29. - Ceramic education of today, by Ralph K. Hursh. p. 30-41. - Ceramic education in the future, by Nelson W. Taylor. p. 42-53. - Changing styles in design and manufacture - ceramic and otherwise, by Charles M. Harder. p. 54-66. - Program for Commencement, June 1950. 67-68. - Committee p. 68.

CERAMIC HIGH "K" TITANATE IMPROVEMENT EVALUATION. FINAL REPORT UNDER CONTRACT NO. W36-039-SC-44534, by H. I. Oshrey. Erie Resistor Corporation, Erie, Pa. Jan 1951. 650p graphs, tables Mi $9.00, Ph $81.25. PB 104132

A study has been made of the variation with temperature of various electrical properties of ceramic titanate dielectric bodies. The bodies were prepared using various production techniques and different batches of raw materials. Over the range tested, -50° C to +250°C, the results obtained indicate that variations due to changes in raw materials are much more significant than those due to the changes made in processing techniques. The data obtained, however, may be used to make a preliminary evaluation of the performance of these dielectric bodies at high temperature. In general it appears that their use at temperatures above 150°C is severely limited due to the sharp increase in power factor and to the low volume resistivity of these materials above this temperature.

CONCRETE MADE FROM LIGHTWEIGHT AGGREGATE. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, Eng. Jul 1951. 6p table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 104744

1. Concrete, Air-entrained - Gt. Brit. 2. Aggregates, Lightweight - Gt. Brit. 3. Concrete aggregates - Gt. Brit. 4. Cement, Plastic - Gt. Brit. 5. DSIR BRD 32.

S. O. Code no. 72-22-0-32.

RESEARCH AND DEVELOPMENT ON THE PHASE DIAGRAMS OF THE TI-MO, TI-CB, AND TI-SI ALLOY SYSTEMS. REPORT NO. 5, JULY 1-AUG 30, 1950, by Harold D. Kessler and M. Hansen. Armour Research Foundation, Chicago, Ill. Sep 1950. 53p drawings, graphs Mi $2.75, Ph $7.50. PB 104575

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-columbium alloys 4. Titanium molybdenum alloys 5. Titanium-silicon alloys 6. ARF Project 90-773B, Report no. 5. Contract no. AF 33(038)-8708.

RESEARCH AND DEVELOPMENT ON TITANIUM ALLOYS. SECOND PROGRESS REPORT COVERING THE PERIOD SEP 1 TO OCT 31, 1949 ON CONTRACT NO. AF 33(038)-3736. Battelle Memorial Institute, Columbus, Ohio. Oct 1949. 80p photos, drawings, graphs, tables (part fold) Mi $3.50, Ph $10.00. PB 104641

Progress is reported in development of titanium alloys. Phase relations in titanium - 0 to 1% germanium and titanium -0 to 10% nickel alloys were investigated. Nickel was found to limit markedly the alpha-phase field and to lower the beta solvus line. The range of compositions investigated in the binary titanium-silver systems was extended to 5% silver, and titanium-beryllium alloys containing 0.1 to 1% beryllium were investigated. Additions of 1 and 2% columbium or tantalum to Process A metal increased the tensile strength and lowered the ductility of Process A titanium. Ternary alloys of managese and carbon, manganese and vanadium, and molybdenum and tungsten, prepared by adding the pure metals during arc melting, had quite erratic tensile properties when tested after fabrication to sheet. Tests were completed on evaluation of "hot-pressed" titanium carbide and graphite crucibles. For 1st report see PB 104429; for 3d report see PB 104461, for 4th report see PB 104673. Contents: Summary. - Arc melting titanium-base alloys, by O. W. Simmons and C. T. Greenidge. - Evaluation of experimental titanium-base alloys, by C. M. Craighead, F. Fawn and L. W. Eastwood. - Investigation of refractories for melting titanium, by P. D. Maddex and L. W. Eastwood. The Derge method of analyzing for oxygen in titanium by vacuum fusion, by M. W. Mallett.

RESEARCH AND DEVELOPMENT ON TITANIUM ALLOYS. THIRD PROGRESS REPORT COVERING THE PERIOD NOVEMBER 1 TO DECEMBER 31, 1949 ON CONTRACT NO. AF 33(038)-3736, by O. W. Simmons, C. T. Greenidge, C. M. Craighead, F. Fawn, L. W. Eastwood and P. J. Maddex. Battelle Memorial Institute, Columbus, Ohio. Dec 1949. 59p graphs, tables (9 fold) Mi $2.75, Ph $7.50. PB 104461

Progress is reported in the development of titanium alloys. An investigation was made of the phase relations in ternary titanium-molybdenum alloys containing additions of carbon, copper, chromium, manganese, iron, cobalt, or nickel, and in ternary titanium-manganese alloys containing additions of nitrogen, copper, molybdenum, or cobalt. The effects of the properties produced by the combined additions of carbon and nitrogen in titanium-manganese and titanium-molybdenum base were also investigated. A melting technique was developed which assures greater uniformity in 0.5-lb ingots. Tests were completed on the evaluation of silicon carbide (Crystolon) and silicide coating on tungsten, tantalum, and molybdenum crucibles. A hot-pressed ZrO_2 crucible that has been prefired at 1400°F to oxidize any surface carbon was also tested. Contents: - Arc melting titanium-base alloys, by O.W. Simmons and C. T. Greenidge. p. 123-124. - Evaluation of experimental titanium-base alloys, by C. M. Craighead, F. Fawn and L. W. Eastwood. p. 125-163. - Investigation of refractories for melting titanium, by P.J. Maddex and L. W. Eastwood. p. 163-169.

STUDIES OF A COMPRESSIBILITY TEST FOR METAL POWDERS, by Waldon E. Kiesshauer. Jan 1950. 35p graphs, tables Mi $2.25, Ph $5.00. PB 104495

A study was made of the influence of several variables which affect the reproducibility of a compressibility test for metal powders. A solution of stearic acid in acetone was used as a die wall lubricant and Swedish sponge iron was the test powder. The method of applying the lubricant was investigated, which indicated that filling the die with the lubricating solution and immediately emptying it was the best method. A concentration of 80 g stearic acid per liter of acetone gave higher compressibilities and better reproducibility than other concentrations. A higher average density was obtained by compacting the powder immediately after applying the lubricant. Forty-six samples were compacted under rigidly controlled conditions in a highly polished die. Compacting pressures were found to affect densities. Compressibility tests were also made in a die with deep scratches and in a badly worn die. Thesis-Rensselaer Polytechnic Institute.

STUDY OF THE ANOMALY IN THE RESISTIVITY-TEMPERATURE RELATIONSHIP OF NICKEL-CHROMIUM ALLOYS, by Mario Silvestrone. Jan 1950. 45p diagrs, graphs Mi $2.50, Ph $6.25. PB 104513

An x-ray diffraction study was made to determine whether a phase or structure change could be correlated with the anomaly which arises in the resistivity-temperature relationship of Ni-Cr alloys. The properties of Nichrome V (approx 80 weight percent Ni and 20 weight percent Cr, with small amounts of other elements), were determined in the temperature range 400° to 800°C. A definite change in lattice parameter was found, closely paralleling the change in resistivity with temperature. This evidence, together with the results of other studies on Nichrome V, appears to indicate that a short range ordering phenomenon is taking place. This phenomenon can also explain the lower resistivity of the hard wire compared with the soft wire at temperatures below 500°C. Thesis-Rensselaer Polytechnic Institute. Title page illegible.

TEMPERATURE DISTRIBUTION DURING ELECTRICAL RESISTANCE SINTERING OF POWDER METAL COMPACTS, by David A. Vermilyea. Jan 1950. 68p photos, diagrs, graphs, tables Mi $3.00, Ph $8.75. PB 104143

A method for measuring the temperature distribution in compacts sintered by the short time passage of high electric current is proposed. The method consists of imbedding wires of different melting points in the powder during compaction, examining the compact microscopically after sintering for evidence of the melting of the wire, and taking the melting point of the wire as the temperature indication. The possibility of altering the temperature distribution by means of shaped wafers or partially insulated wafers was considered and some experimental results are pre-

sented. It was found that it was possible to alter the temperature distribution to a very great extent. Some observations of alloying during sintering were made. The method was applied to brass compacts and compacts made from Buel and Plast iron powder. Thesis-Rensselaer Polytechnic Institute.

TITANIUM PHASE DIAGRAMS. REPORT NO. 8: PHASE DIAGRAMS OF THE TITANIUM-ALUMINUM, TITANIUM-CHROMIUM-IRON, AND TITANIUM-OXYGEN ALLOY SYSTEMS, JAN 16-MAR 15, 1951, by Harold D. Kessler, M. Hansen, R. A. Lubker. Armour Research Foundation, Chicago, Ill. Apr 1951. 28p photos, graphs, tables Mi $2.00, Ph $3.75. PB 104622

1. Phase diagrams 2. Alloys, Binary - Equilibrium diagrams 3. Titanium-aluminum alloys 4. Titanium-chromium iron alloys 5. Titanium-oxygen alloys 6. ARF Project 90-773B, Report no. 8. Contract no. AF 33(038)-8708.

WARMWALZVERSUCHE AN EIN-UND ZWEISEITIG PLATTIERTEN STAHL (HOT-ROLLING EXPERIMENTS ON STEEL CLADDED ON ONE AND ON TWO SIDES) BY ANTON POMP AND WERNER LUEG. KALTWALZVERSUCHE MIT NICKEL-, KUPFER- UND MESSINGPLATTIERTEN STAHL (COLD-ROLLING EXPERIMENTS ON STEEL CLADDED WITH NICKEL, COPPER AND BRASS) by Anton Pomp and Georg Weddige. Kaiser Wilhelm Institut für Eisenforschung, Düsseldorf, Ger. 1938-1942. 29f photos, graphs, tables (Text in German) Mi $2.00, Enl Pr $5.00. PB 104356

1. Cladding - Germany 2. Steel, Clad - Rolling - Germany 3. Steel - Plating, Brass - Germany 4. Steel - Plating, Copper - Germany 5. Steel - Plating, Nickel - Germany 6. Micro BIOS DOCS 2174/1528/4-5 7. Micro BIOS FD 1283/47, Frames 42-53 8. Micro BIOS FD 1283/47, Frames 122-137.

English abstract included. Abstract available as PB 104356s. 2p. Mi $1.25, Ph $1.25.

METEORALOGY AND CLIMATOLOGY

ANALYSIS OF THE AUDIO-FREQUENCY FLUCTUATIONS IN RADAR STORM ECHOES: A KEY TO THE RELATIVE VELOCITIES OF THE PRECIPITATION PARTICLES, by Glenn R. Hilst. Massachusetts Institute of Technology. Dept. of Meteorology. Nov 1949. 85p diagrs, graphs Mi $3.75, Ph $11.25. PB 104720

1. Radar - Signals - Fluctuations 2. Rasaph (Radar signal spectrograph) 3. Rain and rainfall - Velocity 4. SIG Contract W36-039-sc-32038, Report no. 9A.

Dept. of the Army project: 3-99-05-022. Signal Corps project: 122B-O. Weather Radar research. Technical report no. 9, pt. A.

PROJECT CIRRUS. OCCASIONAL REPORT NO. 28: CONCENTRATION OF ICE CRYSTAL NUCLEI UNDER VARIOUS WEATHER CONDITIONS, by W. E. Hubert and J. J. Wells. General Electric Co., Research Laboratory, Schenectady, N. Y. Jun 1951. 24p diagrs, graph, tables Mi $2.00, Ph $3.75. PB 104809

1. Ice formation 2. GE RL 541 3. SIG Contract W-36-039-sc-38141.

Eighteenth occasional report under Contract no. W-36-039-sc-38141. Dept. of the Army project: 3-99-07-022. Signal Corps project: 172B.

VERTICAL RECORDING OF RAIN BY RADAR, by Sven K. H. Forsgren and Olof F. Perers. Chalmers University of Technology, Gothenburg, Sweden. 1951. 20p photos, graphs Mi $1.75, Ph $2.50. PB 104705

1. Radar, Meteorological - Sweden 2. Rain and rainfall - Measurements - Sweden 3. Chalmers University of Technology, Gothenburg, Sweden. Transactions nr. 107 4. Chalmers University of Technology, Gothenburg, Sweden. Research Laboratory of Electronics. Report no. 20.

Transactions of Chalmers University of Technology nr. 107. Reports from the Research Laboratory of Electronics no. 20.

MINERALS AND MINERAL PRODUCTS

CERAMIC EDUCATION, PAST, PRESENT AND FUTURE: SYMPOSIUM HELD AT ALFRED UNIVERSITY ON JUNE 12, 1950. New York State College of Ceramics, Alfred, N. Y. 1951. 64p photos, table Available from New York State College of Ceramics, Alfred University, Alfred, N. Y. PB 104005

Contents: Foreword by S. R. Scholes and J. F. McMahon. p. 3. - The panel. p. 6-10. - Development of ceramic education, by Lawrence E. Barringer. p. 11-29. - Ceramic education of today, by Ralph K. Hursh. p. 30-41. - Ceramic education in the future, by Nelson W. Taylor. p. 42-53. - Changing styles in design and manufacture - ceramic and otherwise, by Charles M. Harder. p. 54-66. - Program for Commencement, June 1950. 67-68. - Committee p. 68.

CERAMIC HIGH "K" TITANATE IMPROVEMENT EVALUATION. FINAL REPORT UNDER CONTRACT NO. W36-039-SC-44534, by H. I. Oshrey. Erie Resistor Corporation, Erie, Pa. Jan 1951. 650p graphs, tables Mi $9.00, Ph $81.25. PB 104132

A study has been made of the variation with temperature of various electrical properties of ceramic titanate dielectric bodies. The bodies were prepared using various production techniques and different batches of raw materials. Over the range tested, -50° C to +250°C, the results obtained indicate that variations due to changes in raw materials are much more significant than those due to the changes made in processing techniques. The data obtained, however, may be used to make a preliminary evaluation of the performance of these dielectric bodies at high temperature. In general it appears that their use at temperatures above 150°C is severely limited due to the sharp increase in power factor and to the low volume resistivity of these materials above this temperature.

CONCRETE MADE FROM LIGHTWEIGHT AGGREGATE. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, Eng. Jul 1951. 6p table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 104744

1. Concrete, Air-entrained - Gt. Brit. 2. Aggregates, Lightweight - Gt. Brit. 3. Concrete aggregates - Gt. Brit. 4. Cement, Plastic - Gt. Brit. 5. DSIR BRD 32.

S. O. Code no. 72-22-0-32.

DEVELOPMENT AND APPLICATION OF BARIUM TITANATE CERAMICS AS NON-LINEAR CIRCUIT ELEMENTS. FIRST QUARTERLY REPORT ON CONTRACT W36-039-SC-44606, by James M. Brownlow. Glenco Corp., Metuchem, N. J. Nov 1949. 25p graphs, tables Mi $2.00, Ph $3.75. PB 104392

Progress in the development and application of barium titanate ceramics as nonlinear circuit elements is reported. A large number of nonlinear condenser compositions have been prepared in thin sheet form and are ready for measurement. Apparatus for measuring the condensers at radio frequencies has been assembled. The 60-cycle oscillographic hysteresis loop apparatus is ready for operation. Preliminary measurements over a limited temperature interval have been made on the nonlinear behavior of three titanate compositions at 200 and 500 kc. A body of $BaTiO_3$ 87.5% plus BaCaMg zirconates had the highest voltage coefficient of dielectric-constant 2. This body has also the advantage of a low-temperature coefficient of dielectric constant between 20° and 35°C. For 2d report see PB 104394.

DEVELOPMENT AND APPLICATION OF BARIUM TITANATE CERAMICS AS NON-LINEAR CIRCUIT ELEMENTS. SECOND QUARTERLY REPORT ON CONTRACT W36-039-SC-44606. Glenco Corp., Metuchem, N. J. Feb 1950. 36p graphs, table Mi $2.50, Ph $5.00. PB 104394

Progress is reported in the development of barium titanate ceramics as nonlinear circuit elements. The nonlinear properties of seven titanate compositions were evaluated as a function of bias frequency and of temperature. Three single $BaTiO_3$ crystals were also studied. It was found that $BaTiO_3$ below the Curie point has a high loss increase with increasing bias voltage. Above the Curie point, the nonlinearity of titanate ceramics is constant with bias frequency up to 20,000 cycles. A third class of titanates with broad Curie regions was found to have much less temperature-dependent properties than $(BaSr)TiO_3$ mixtures with sharp Curie points. Voltage coefficients as high as -3.0% per volt/mil are possible with these types. The nature of the nonlinear response of single crystals to $BaTiO_3$ was found to be the same as that of the ceramic titanates. For 1st report see PB 104392.

DEVELOPMENT OF CORDIERITE TYPE CERAMIC BODIES. PROGRESS REPORT NO. 2. ON CONTRACT NO. W36-039-SC-32298, NOV 15, 1946-FEB 15, 1947, by H. R. Wisely and K. A. Gebler. Rutgers University. Dept. of Ceramics, New Brunswick, N. J. Feb 1947. 36p diagrs, table Mi $2.25, Ph $5.00. PB 104546

Within the field studied, cordierite appears as the major crystal constituent in bodies having a wide range of composition. Maximum development was observed in the area near the theoretical cordierite composition (13.78% MgO, 34.84% Al_2O_3, 51.38% SiO_2). The quantity of cordierite was found to increase most rapidly with rising temperatures in the range 1200-1300°C., though the maximum development was observed in compositions fired at 1400°C. Vitrification of a large portion of the field was observed when the compositions were fired to 1400°C. Glassy melts formed from those bodies relatively high in magnesia content. No glassy melt, and a much smaller area of vitrification was observed when the bodies were fired at 1300°C. From these results it must be concluded that, within the MgO-Al_2O_3-SiO_2 system alone, it is probable that no single composition exists that is simultaneously capable of extensive cordierite development and a vitrification range of 100°C.

DEVELOPMENT OF TEST PROCEDURES FOR CERAMICS FOR AIRCRAFT POWER PLANTS, by L. F. Ayres. U. S. Air Materiel Command. Engineering Division. Power Plant Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. n.d. 10p Mi $1.25, Ph $1.25. PB 104451

The development of test procedures for ceramics for application in aircraft power plants is discussed. The present test procedures for tensile tests, stress rupture tests, modulus of rupture test, thermal shock resistance, and thermal conductivity are summarized. The tests for ceramic coatings consist more or less of an accelerated lift test, with a number of heating and cooling cycles and soaking periods at high temperatures. Further work is being undertaken on the permeability of oxygen through coatings and inter-surface reactions. The exact nature of failure of parts, such as ceramic rocket nozzles and liners, must be further investigated. Until the requirements can be fully stated, actual rocket engine assemblies of more promising materials must be built and tested in a full-scale engine.

EFFECTIVENESS OF CERAMIC COATINGS IN REDUCING CORROSION OF FIVE HEAT-RESISTANT ALLOYS BY LEAD-BROMIDE VAPORS, by Dwight G. Moore and Mary W. Mason. U. S. National Advisory Committee for Aeronautics. Jun 1951. 24p photos, diagr, graphs, tables Mi $2.00, Ph $3.75. PB 104112

A study is presented of the corrosive attack of lead-bromide vapors in an air atmosphere on uncoated preoxidized, and ceramic-coated specimens of five heat-resistant alloys. After exposure to the vapors for 6 hours at temperatures of 1350°, 1500°, and 1650°F, a fairly rapid corrosion and a loss of thickness of the uncoated and preoxidized specimens occurred. At the same conditions, ceramic-coated specimens showed no significant attack. NACA TN 2380.

ENGINEER-CONTRACTORS REPORT ON ALUMINA-FROM-CLAY EXPERIMENTAL PLANT (PLANCOR 1865) AT SALEM, OREGON. VOL. 1. Chemical Construction Corporation, New York, N. Y. May 1947. 260p fold drawings, tables Mi $9.00, Ph $32.50. PB 103807

1. Alumina - Production 2. Clay, Aluminum containing 3. Plancor 1865 4. Columbia metals 1865 5. Chemico process (Aluminum from clay) 6. Bauxite - Substitutes 7. Reconstruction Finance Corp.

This report is continued as PB 103808. See also PB 103803-PB 103806. Accompained by over-all comments on the final reports of the alumina-from-clay projects, by Henry A. Tobelmann, Harry J. Morgan and W. C. Graham.

ENGINEER-CONTRACTORS REPORT ON ALUMINA-FROM-CLAY EXPERIMENTAL PLANT (PLANCOR 1865) AT SALEM, OREGON. VOL. 2. Chemical Construction Corporation, New York, N. Y. May 1947. 170p fold drawing, maps, tables Mi $6.25, Ph $21.25. PB 103808

This report is a continuation of PB 103807. See also PB 103803-PB 103806.

FUNDAMENTAL STUDIES OF CERAMIC MATERIALS: FINAL SUMMARY REPORT TO OFFICE OF NAVAL RESEARCH, NAVY DEPARTMENT UNDER CONTRACT NO. N5ORI-111, TASK ORDER I, PROJECT NR032-181, by H. Z. Schofield, J. F. Lynch and W. H. Duckworth. Battelle Memorial Institute, Columbus, Ohio. Mar 1949. 130p photos, diagrs, graphs, tables Mi $5.00, Ph $16.25. PB 104157

An investigation was made on bodies of alumina, zircon, and beryllia to obtain fundamental data on potentialities of these materials and to study their possible use in gas-turbine and jet-propulsion devices. The investigation included determination of the effect of the physical character of the raw material, fabrication methods, and firing time and temperature on the physical, mechanical, and mineralogical properties. On the basis of the strength values observed, the alumina bodies showed some promise for use as stressed components of gas turbines or jet-propulsion devices. Zircon structures of low porosity were obtained which had moduli of rupture greater than 20,000 psi. These properties were not obtained, however, without some dissociation of the zircon during firing. The reputed toxicity, the high cost, and questionable availability must be considered with beryllia.

HARLEYVILLE ALUMINA PLANT (PLANCOR 1831), by F. R. Archibald, C. M. Nicholson and staff of Ancor Corporation. Ancor Corporation, St. George, S. C. Sep 1946. 377p photos (1 fold), diagrs, drawings, maps, graphs, tables Mi $9.00, Ph $47.00. PB 103809

1. Alumina - Production 2. Clay, Aluminum containing 3. Plancor 1831 4. Bauxite - Substitutes 5. Reconstruction Finance Corp.

See also PB 103803-PB 103808, PB 103810. This copy includes appendix. Accompained by over-all comments on the final report of the alumina-from-clay projects, by Henry A. Tobelmann, Harry J. Morgan and W. C. Graham. Apr 1947.

IMPROVEMENT OF CERAMICS FOR USE IN HEAT ENGINES, by F. J. Bradshaw. Gt. Brit. Royal Aircraft Establishment, Farnborough, Eng. Oct 1949. 8p graphs, table Mi $1.25, Ph $1.25. PB 104446

In order to predict the thermal shock properties, an investigation was made of the relationships between some of the physical properties of ceramic components of heat engines (such as turbine blades and rocket nozzles) and of the thermal stresses occurring in them when subjected to rapid changes in temperature. The physical properties compared are characteristics such as conductivity, specific heat, expansion coefficient, elasticity modulus, and density. The ceramics investigated include silica glass, beryllia, zircon, alumina, mullite, and zirconia. These materials are assessed for thermal shock in terms of a simple thermal-shock index. A tentative order of merit for thermal-shock strength is established for the ceramics. It is also demonstrated that a small amount of ductility is necessary in the material if it shall overcome thermal shock. Tech. note Met. III. U.D.C. 666.31:621.4.

INTRODUCTION TO REACTIONS IN THE SOLID STATE. New York State College of Ceramics, Alfred, N. Y. Mar 1950. 91p diagrs, graphs, tables Mi $4.25, Ph $12.50. PB 104154

An introduction to the subject of solid state reactions in theory and experiment is presented. The role of diffusion is pointed out as well as the significance of crystal structure, crystal defects, crystallographic transitions, changes in oxidation state, particle size and temperature. Chemical reaction between materials in the solid state is a very common phenomenon in ceramics and the principles governing solid state reactions are basic to the understanding of such diversified processes as ion exchange in clays, thermal decomposition of clays and carbonates, oxidation, polymorphic transitions, the synthesis of ceramic compounds and the relationships between metals and ceramic compounds in enameling, glass-to-metal seals, and in the cermet type of refractory body. Understanding of the processes involved is particularly helpful in the growth of synthetic crystals and in the synthesis of borides, carbides, and nitrides. Prepared under Contract N6ori-143, NR-032-022 with Materials Section, Office of Naval Research.

IRON AND MANGANESE ORE POTENTIAL OF JAPAN, by Charles F. Park, Jr. Supreme Commander for the Allied Powers, Natural Resources Section. May 1951. 24p map Mi $2.00, Ph $3.75. PB 104024

1. Iron ores - Japan 2. Manganese ore deposits - Japan 3. SCAP NRS PS 50.

PRODUCTION OF AND PLANT FOR PORTLAND CEMENT AND SULPHUR. Wirtschaftliche Forschungsgesellschaft m.b.H., Niedersachswerfen, Ger. Sep 1942. 12f (Text in German) Mi $1.75, Enl Pr $3.75. PB 104784

1. Gewerkschaft Keramchemie-Berggarten, Siershahn, Ger. 2. Cements - Production - Germany 3. Sulfur - Production - Germany 4. Linings - Germany 5. Keratylen (Trade name) 6. Ceramic materials - Bonding - Germany 7. Micro BIOS FD 2767/46, Frames 1-10.

English abstract included. Abstract available as PB 104784s. 2p. Mi $1.25, Ph $1.25. Includes letter from Gewerkschaft Keramchemie-Berggarten on recommended lining for equipment in the neutralization plant.

REACTIONS OF CARBIDES WITH GASES AT ELEVATED TEMPERATURES. PART I: BEHAVIOUR IN OXIDISING ATMOSPHERES, by G. H. Cockett and W. Watt. Gt. Brit. Royal Aircraft Establishment, Farnborough, England. Apr 1950. 23p photos, graphs, tables Mi $2.00, Ph $3.75. PB 104139

An investigation was made to determine the oxidation resistance in air of sintered compacts of the carbides of titanium, zirconium, columbium, tantalum vanadium, chromium and boron. The preparation of the samples and the oxidation apparatus used are discussed, and the results of the tests are given in tabular form. It was found that sintered commercially pure zirconium, vanadium, tantalum and columbium carbides oxidize rapidly in air at 800°C. Titanium carbide oxidizes relatively slow and with a linear rate for useful exposure times at 900° and 1000°C. Chromium carbide (Cr_3C_2) possesses a very low and probably useful degree of resistance to oxidation at temperatures up to 1000°C and can be satisfactorily hot pressed at 1350°C. Boron carbide

has a low rate of oxidation at 800°C, but at 900° and 1000°C oxidation is fairly rapid. Technical note no. MET. 124. R.A.E. Ref. Mat. M3/M10574/WW/41. U.D.C. no. 546.3.261: 543 .872.036.

REFRACTORY COATINGS, MODEL GAPA, PREPARED by P. D. Johnson. Boeing Aircraft Co., Seattle, Wash. Feb 1950. 7p Mi $1.25, Ph $1.25. PB 104452

An investigation was made to find a material or combination of materials that would withstand the conditions existing at the exit of the ramjet engine. These materials could then be used for the construction of the instrumentation for making physical measurements in combustion and performance studies. Rods were considered representative of the instrument problem and were used because of fundamental shape and availability. A suitable coating meeting the requirements was found. The method of preparation and application is described. Contract no. W33-038-ac-13875. Project MX-606. Document no. D-10420.

REPORT ON KALUNITE, INC.: PLANCOR 291, by M. Paul Freeze and R. D. Twelves. Kalunite Inc., Salt Lake City, Utah. Vol. 1. 1947. 231p drawings, graphs, tables Mi $8.25, Ph $30.00. PB 103803

1. Kalunite process (Aluminum from clay) 2. Alumina - Production 3. Clay, Aluminum containing 4. Plancor 291 5. Bauxite - Substitutes 6. Reconstruction Finance Corp.

For Vols 2-4 see PB 103804 - PB 103806. See also PB 103804 - PB 104810. Accompained by over-all comments on the final reports of the alumina-from-clay projects, by Henry A. Tobelmann, Harry J. Morgan and W. C. Graham. Apr 1947.

REPORT ON KALUNITE, INC.: PLANCOR 291, by M. Paul Freeze and R. D. Twelves. Vol. 2. Kalunite Inc., Salt Lake City, Utah. 1947. 110p drawings, tables Mi $4.50, Ph $13.75. PB 103804

For vols 1, 3-4 see PB 103803, PB 103805 - PB 103806. See also PB 103807-103810.

REPORT ON KALUNITE, INC.: PLANCOR 291, by M. Paul Freeze and R. D. Twelves. Kalunite Inc., Salt Lake City, Utah. Vol. 3. 1947. 245p photos, drawings, tables Mi $9.00, Ph $31.25. PB 103805

For Vols 1-2, 4 see PB 103803 - PB 103804, PB 103806. See also PB 103803-PB 103804, PB 103806-PB 103810. See also PB 103807-103810.

REPORT ON KALUNITE, INC.: PLANCOR 291, by M. Paul Freeze and R. D. Twelves. Kalunite Inc., Salt Lake City, Utah. Vol. 4. 1947. 71p diagrs, drawings Mi $3.50, Ph $10.00. PB 103806

For Vols 1-3 see PB 103803 - PB 103805. See also PB 103803-PB 103805, PB 103807-PB 103810. See also PB 103807-103810.

RESEARCH AND DEVELOPMENT ON TITANIUM ALLOYS. FOURTH PROGRESS REPORT COVERING THE PERIOD JAN 1 TO FEB 28, 1950 ON CONTRACT AF 33(038)-3736. Battelle Memorial Institute, Columbus, Ohio. Feb 1950. 43p photos, graphs, tables (part fold) Mi $2.50, Ph $6.25. PB 104673

Progress is reported in the development of titanium alloys. The effects of carbon and nitrogen additions on the transformation range of titanium-manganese and titanium-molybdenum alloys were investigated. Additions of 1, 2, and 3% tungsten to titanium-molybdenum alloys raised the tensile strength and hardness, but lowered the elongation. Large-sized ingots, 11 to 15 lb, of two-alloy compositions were prepared by the double-melting technique. The as-hot rolled properties for the large-sized ingots averaged about 30,000 psi higher in tensile strength than those obtained from 0.5-lb ingots of the same nominal composition. Both alloy compositions in the form of hot-rolled sheet and bar stock responded to an aging treatment of four hours at 750°F. Variable bend ductility and hardness anisotropy were observed with the hot-rolled sheet of both compositions. For 1st report see PB 104429; for 2d report see PB 104641; for 3d report see PB 104461. Contents: Summary. - Arc melting tetanium-base alloys, by O. W. Simmons and C. T. Greenidge. - Evaluation of experimental titanium-base alloys, by C. M. Craighead, F. Fawn and L. W. Eastwood. - Investigation of refractories for melting titanium, by C. M. Craighead and L. W. Eastwood. - Analytical methods for titanium-base alloys.

RESEARCH ON SURFACE PROPERTIES OF FINE PARTICLES. FINAL REPORT ON CONTRACT NO. W36-039-sc-38258, by J. M. Dallavalle, Clyde Orr, Jr., and H. G. Blocker. Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, Ga. Mar 1951. 72p photo, drawings, graphs, tables Mi $3.50, Ph $10.00. PB 104372

1. Particles - Absorptive properties 2. Materials - Absorptive properties 3. Metals - Absorptive properties 4. Surfaces - Absorptive properties.

For Semi-final report see PB 101027. Project no. 143-68. Department of the Army Project: 3-99-15-022. Signal Corps Project: 32-152B-O.

SERVICES, FACILITIES AND MATERIALS FOR RESEARCH AND DEVELOPMENT LEADING TOWARD IMPROVED OR NEW DESIGNS OF GLASS DIELECTRIC CAPACITORS. FINAL REPORT ON CONTRACT NO. W36-039-SC-38227, COVERING PERIOD FEBRUARY 1, 1949-JULY 31, 1950, by G. P. Smith. Corning Glass Works, Corning, N. Y. Jul 1950. 42p tables (4 fold) Mi $2.50, Ph $6.25. PB 104373

1. Capacitors, Glass dielectric - Research.

Signal Corps Specification no. FMSCL-5014-A. Signal Corps Project no. SCCSCL-SMB-cp 2006-C22-Ceramics.

STUDY OF THE PREPARATION OF ULTRA-THIN CERAMIC FILMS, BY LEWIS BALAMUTH, M. U. COHEN, ALFRED SCHNEIDER AND DAVID BUSKIN. CONTRACT NO. W-36-039-SC-38248, FINAL REPORT. Balco Research Laboratories, Newark, N. J. Sep 1949. 56p drawings Mi $2.75, Ph $7.50. PB 104093

1. Films, Plastic - Production.

Dept. of the Army project: 3-99-15-022. Signal Corps project: 32-152 B-O.

SURFACE CONDUCTIVITY AT THE PYREX GLASS: SOLUTION INTERFACE, by J. W. McBain, Harriette Huff, and A. P. Brady. Stanford Research Institute, Stanford, Calif. Jul 1949. 26p photo, graph, tables Mi $2.00, Ph $3.75. PB 105016

1. Electric conductivity - Measurements 2. Salt solutions - Conductivity 3. Pyrex glass.

Contract N6ori-154, Task order II on "Properties of surfaces". SRI project no. 114, Technical report no. 14.

SYNTHETIC MICA RESEARCH PROJECT. CONTRACT NO. W36-039-SC-32258, PROGRESS REPORT NO. 12, JUNE 1, 1949 TO SEP 30, 1949, AND SUMMARY OF PREVIOUS WORK SEP 1, 1946 TO MAY 31, 1949, PREPARED by William C. Aitkenhead. Colorado School of Mines, Golden, Colo. Sep 1949. 48p drawings Mi $2.75, Ph $7.50. PB 104091

1. Mica, Synthetic - Production.

Dept. of the Army project: 3-99-15-022. Signal Corps project: 152B. For other reports on this project see PB 99963, 99941, 104089-104090, 104092.

SYNTHETIC MICA RESEARCH PROJECT. CONTRACT NO. W36-039-SC-32258, FINAL REPORT, by William C. Aitkenhead. Colorado School of Mines, Golden, Colo. Sep 1949. 13p drawings in pocket Mi $1.75, Ph $2.50. PB 104092

1. Mica, Synthetic - Production 2. Furnaces, Mica - Design.

Dept. of the Army project: 3-99-15-022. Signal Corps project: 152B. For other reports on this project see PB 99963, 99941, 104089-104091.

SYNTHETIC MICA RESEARCH. CONTRACT NO. DA-36-039-SC-71, 1ST PROGRESS REPORT, FEB 1, 1950 TO MAR 31, 1950, by William C. Aitkenhead. Colorado School of Mines, Golden, Colo. Mar 1950. 6p Mi $1.25, Ph $1.25. PB 104089

1. Mica, Synthetic - Production.

Dept. of the Army project no.: 3-99-15-022. Signal Corps project no. 32-152B-O. For other reports on this project see PB 99963, 99941, 104090-104092.

SYNTHETIC MICA RESEARCH. CONTRACT NO. DA-36-039-SC-71, FINAL REPORT, FEB 1, 1950 TO JUNE 30, 1950, by William C. Aitkenhead. Colorado School of Mines, Golden, Colo. Jun 1950. 38p fold drawings Mi $2.25, Ph $5.00. PB 104090

1. Mica, Synthetic - Production 2. Furnaces, Mica - Design.

Dept. of the Army project: 3-99-15-022. Signal Corps project: 32-152 B-O. For other reports on this project see PB 99963, 99941, 104089, 104091-104092.

TECHNICAL REPORT ON EXPERIMENTAL ALUMINA PLANT, PLANCOR 1844, LARAMIE, WYOMING, by W. C. Graham. Reconstruction Finance Corp. Mar 1947. 128p photos (1 fold), fold maps, fold diagrs, fold drawings, tables Mi $5.00, Ph $16.25. PB 103810

1. Alumina - Production 2. Clay, Aluminum containing 3. Plancor 1844 4. Monolith 1844 5. Cements, Alumina-free 6. Anorthosite 7. Bauxite - Substitutes

Duncan R. Williams, chief chemist, F. G. Anderson, Superintendent, and E. A. Ledyard, Research chemist. See also PB 103803-PB 103809. Accompained by overall comments on the final reports of the alumina-from-clay projects by Henry A. Tobelmann, Harry J. Morgan and W. C. Graham. Apr 1947.

TEST OF REFLECTIVE-TYPE PIPE INSULATION, by R. B. Plate. U. S. Naval Engineering Experimental Station, Annapolis, Md. Dec 1950. 13p graphs, tables Mi $1.75, Ph $2.50. PB 104236

1. Pipe - Insulation 2. Insulating materials 3. NAV EES 1H51806.

THERMAL SHOCK RESISTANCE OF U. S. PORCELAIN ENAMELING COMPANY CERAMIC COATING FOR EXHAUST MUFFLERS AND PIPING, by Robert V. Rosenwald and Alan R. Schrader. U. S. Naval Engineering Experiment Station, Annapolis, Md. Aug 1950. 30p photos Mi $2.00, Ph $3.75. PB 104250

Six welded T-sections were ceramic coated by the U. S. Porcelain Enameling Company and delivered to this Station for test. After an initial inspection, the test sections were heated in an electric furnace to 650°F and were then quenched in water at 80°F to 100°F. On the basis of these tests it was considered that the U. S. Porcelain Enameling Company ceramic coating, as represented by these specimens, had satisfactory thermal shock resistance. NS 061-071. NAC EES B9008-Q (2).

ORDNANCE AND ACCESSORIES

INTERNAL BALLISTICS, BY AN EDITORIAL PANEL CONSISTING OF F.R.W. Hunt, Chairman, G. H. Hinds C. A. Clemmow and C. J. Tranter. Gt. Brit. Ministry of Supply. 1951. 323p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $5.75. PB 104009

Appendix I. Theory of leaking guns, by J. Corner. p. 237-270. (From Proceedings, Royal Soc., A 188, p. 237, 1947). - Appendix II. Heating of a gun barrel by the propellant gases, by E. P. Hicks. p. 271-290.- Bibliography. p. 291-306. S. O. Code no. 70-589.

RATE AND EXTENT OF IMPROVEMENT IN PERFORMANCE ON THE PEDESTAL SIGHT MANIPULATION TEST, by Edward A. Bilodeau and Robert E. Morin. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. May 1951. 24p graphs, tables Mi $2.00, Ph $3.75. PB 104525

1. Gunnery, Aerial - Training devices 2. AAF HRRC RB 51-10.

Project no. 21-09-009.

PERSONNEL APTITUDE TESTING

FACTORS INFLUENCING THE EFFECTIVENESS OF AUDIO-VISUAL TRAINING AIDS. PT. I: INFLUENCE OF SIMPLE ANIMATION TECHNIQUES ON THE VALUE OF A TRAINING FILM, by A. A. Lumsdaine. U. S. Air Force. Human Resources Research Laboratories, Bolling Air Force Base, Washington, D. C. Apr 1951. 25p drawings, tables Mi $2.00, Ph $3.75. PB 104623

1. Training films, Audio-visual - Animation 2. Training devices - Evaluation 3. AAF HRRL 24.

METHODOLOGICAL STUDY OF FORCED-CHOICE PERFORMANCE RATING, by Richard W. Highland and James R. Berkshire. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. May 1951. 55p diagrs, tables Mi $2.75, Ph $7.50. PB 104524

1. Personnel, Flying - Ability tests 2. Performance tests 3. AAF HRRC RB 51-9.

Project no. 21-07-009.

PREDICTION OF SUCCESS IN COMPLETING THE RADAR CURRICULUM, by Donald W. Rankin. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. Jun 1951. 21p graphs, tables Mi $2.00, Ph $3.75. PB 104526

1. Personnel, Radar - Training 2. Proficiency tests 3. AAF HRRC RB 51-11.
Project no. 21-06-004.

RESEARCH ON CRITERIA OF OFFICER EFFECTIVENESS, by Glenn E. McClure, Ernest C. Tupes and John T. Dailey. U. S. Air Force. Human Resources Research Center. May 1951. 36p tables Mi $2.25, Ph $5.00. PB 104523

1. Personnel, Flying - Ability tests 2. Performance tests 3. Tests, Officer qualification 4. AAF HRRC RB 51-8.
Project 21-23-027.

SELECTION OF MEN BEST QUALIFIED FOR SUB-ARCTIC AND ARCTIC DUTY; AN EIGHTEEN MONTH LONGITUDINAL STUDY OF AIRMEN ASSIGNED TO ALASKAN DUTY, by Ernest L. McCollum. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. Mar 1951. 8p graphs, tables Mi $1.25, Ph $1.25. PB 104530

1. Personnel, Flying - Psychological tests 2. Personality tests 3. Cold - Psychological effects 4. AAF AAL Project 21-01-007, pt. B.

SURVEY OF HUMAN ADJUSTMENT PROBLEMS IN THE NORTHERN LATITUDES: MORALE SURVEY OF PERSONNEL ASSIGNED TO LADD AIR FORCE BASE, by Ernest L. McCollum. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. Feb 1951. 39p Mi $2.25, Ph $5.00. PB 103910

1. Personnel, Flying - Psychological records 2. AAF AAL Project no. 21-01-022, Program C pt. 1.

SURVEY OF RESEARCH PROBLEMS IN THE ULTILIZATION OF MOBILE TRAINING UNITS, by Robert A. Swanson. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. Apr 1951. 11p Mi $1.75, Ph $2.50. PB 103921

1. Pilots, Air - Training 2. Training units, Mobile 3. AAF HRRC RB 51-6.
Project no. 21-07-026.

PHOTOGRAPHIC AND OPTICAL GOODS

STUDY OF EFFECT OF ILLUMINATION ON INTERPRETATION OF PSEUDO-ISOCHROMATIC PLATES, by Ingeborg Schmidt. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1951. 9p photo, graphs, tables Mi $1.25, Ph $1.25. PB 104527

Pseudo-isochromatic plates were studied in artificial daylight of different intensity and different color temperature. A variation of illumination between 25 and 100 foot-candles affected only deuteranomalous subjects, the error percentage slightly decreasing with more illumination. The color temperature of the illuminating light affected the number of errors made by both normals and color defectives. As the color temperature was increased, normals increased slightly in error percentage; deuteranomalous subjects distinctly, and deuteranopes less noticeably. Protanomalous and protanopic persons did not change their average error score. Only artificial daylight with standardized color temperature and intensity should be used to obtain comparable results in pseudo-isochromatic plate tests. AAF SAM Special project.

PHYSICS

General

EFFECTIVE STRESS AND EFFECTIVE STRAIN IN RELATION TO STRESS THEORIES OF PLASTICITY, by G. N. White, Jr. and D. C. Drucker. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Sep 1949. 36p diagrs, graph Mi $2.25, Ph $5.00. PB 105034

The correlation of experimental data and the proper description of the state and history of deformation of work-hardening materials has received much attention. An often desired objective is the plotting of a variable involving stress alone, a so-called effective stress, against a variable depending on the instantaneous strain or the history of strain, effective strain. Quantities such as maximum or octahedral shearing stress and strain or better an integrated effective strain increment have been employed. Also, simple effective stress definitions have been given for anisotropic as well as isotropic metals by Dorn, by Jackson Smith, Lankford, and by previous investigators. It is shown that the stress-strain relations of a recent theory of plasticity provide a very convenient means of defining and studying effective stress and effective strain. The strong theoretical and practical limitations of such concepts are indicated and the calculation of specific plastic work is discussed for both isotropic and anisotropic metals. One of the major objectives of the paper is to stimulate critical experimental examination of as yet unproved assumptions in the theory of plasticity and in the correlation of experimental data. Contract N7 onr-358, T.O. 1, NR-041-032. GDAM A11-42/36. GDAM TR 42.

EXTREMUM PRINCIPLES OF THE MATHEMATICAL THEORY OF ELASTICITY AND THEIR USE IN STRESS ANALYSIS, by W. Prager. Washington. Engineering Experiment Station, Seattle, Washington. 1951. 26p diagrs, tables Available from Engineering Equipment Station, University of Washington, Seattle, Wash. $.75. PB 105002

1. Elasticity - Theory 2. Mathematical equations and solutions 3. Stress analysis - Methods 4. WEES B119.
Walker-Ames lectures in the College of Engineering University of Washington, Apr 26-May 19, 1950.

HEAT TRANSFER TO BODIES IN A HIGH-SPEED RAREFIED-GAS STREAM, by Jackson R. Stalder, Glen Goodwin and Marcus O. Creager. U. S. National Advisory Committee for Aeronautics. Aug 1951. 25p photos, graphs, tables Mi $2.00, Ph $3.75. PB 104807

The equilibrium temperature and heat-transfer coefficients for transverse cylinders in a high-speed stream of rarefied gas were measured over a range of Knudsen numbers from 0.025 to 11.8 for Mach num-

bers from 2.0 to 3.3. Fully developed free-molecule flow was found to first occur at Knudsen numbers of approximately 2.0. The Nusselt number was found to be a function of the Reynolds number only, and the temperature-recovery factor to depend primarily on the Knudsen number. NACA TN 2438.

ON STRESS DISCONTINUITIES IN PLANE PLASTIC FLOW, by E. H. Lee. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Aug 1949. 41p diagrs Mi $2.50, Ph $6.25. PB 105010

Quasi-static plastic flow in plane strain is considered, adopting the St. Venant theory of an ideal plastic material subjected to strains large in comparison with elastic strains. Prager has shown that the consideration of surfaces of stress discontinuity between regions of continuous stress distribution, enable certain stress boundary value problems to be solved for which continuous solutions cannot be found. The use of this concept, however, provides a variety of solutions for many stress-boundary value problems, all of which satisfy the equations of equilibrium and the condition for plastic flow. In this paper the conditions along the discontinuity are examined, and it is shown that restrictions are imposed on the equations governing the velocities of flow, which must be satisfied in conjunction with the stress conditions. Application to the problem of plastic flow in a wedge with uniform pressure on one face produces a unique set of solutions. A surface of stress discontinuity is necessary for acute angled wedges, while the discontinuous stress solution violates velocity conditions for obtuse angled wedges for which a continuous solution exists. The additional conditions are based on the deduction that the surface of stress discontinuity is an elastic membrane, and the St. Venant theory must be extended to take into consideration elastic strains in the membrane, although, in general, elastic material is considered rigid in this theory. In the membrane, elastic strains permit large changes of curvature which are associated with large plastic strains in the surrounding material. The additional conditions based on the velocity equations confirm the present trend of thought that the so-called static determinacy of the stress equations is misleading in the application of the theory of plastic flow in plane strain. This general question is discussed briefly. The validity of a method of using ficticious stress discontinuities to obtain approximate complete solutions is also discussed. Technical report no. 37. Contract N7onr-358, T. O. I. A11-37. This paper was presented at the third annual Symposium on Applied Mathematics of the American Mathematical Society (Ann Arbor, Michigan June 16, 1949). See also PB 105011.

SEPARATION OF VISCOUS DRAG AND WAVE DRAG BY MEANS OF THE WAKE SURVEY, by Marshall P. Tulin. U. S. David W. Taylor Model Basin, Carderock, Md. Jul 1951. 13p diagr Mi $1.75, Ph $2.50. PB 105006

The wake-survey method of measuring viscous drag is analyzed for flows with surface waves and the result is obtained that the separation of wave and viscous drag is possible and that the method of separation is, without consideration of practical aspects, identical for submerged and surface flows. NS 700-001. DWTMB 772.

SOME MEASUREMENTS OF THE EFFECT OF GASEOUS IMPERFECTIONS ON THE CRITICAL PRESSURE RATIO IN AIR AND THE SPEED OF SOUND IN NITROGEN, by Coleman duP. Donaldson and Jim J. Jones. U. S. National Advisory Committee for Aeronautics. Aug 1951. 15p photos, drawings, graphs, table Mi $1.75, Ph $2.50. PB 104864

Experiments were made to measure the speed of sound in nitrogen at room temperatures in the pressure range of 0 to 2000 pounds per square inch absolute and the critical pressure ratio of air expanded isentropically from stagnation conditions in the same range. The experimental results were then compared with the values obtained by using the Van der Waals equation and the Beattie-Bridgeman equation. NACA TN 2437.

ÜBER DIE STRÖMUNG VON GASEN IN ENGEN KANÄLEN. (FLOW OF GASES IN NARROW CHANNELS), by R.E.H. Rasmussen. Aug 1951. 46p photos, diagrs, drawings, graphs, tables Mi $2.50, Ph $6.25. PB 104865

Measurements were made of the flow of gases through various narrow channels a few microns wide at average pressures from 0.00003 to 40 cm. Hg. The flow rate, defined as the product of pressure and volume rate of flow at unit pressure difference, first decreased linearly with decrease in mean pressure in the channel, in agreement with laminar-flow theory, reached a minimum when the mean path length was approximately equal to the channel width, and then increased to a constant value. The product of flow rate and square root of molecular number was approximately the same function of mean path length for all gases for a given channel. Translation from Annalen der Physik, Band 29, Heft 8, Aug 1937, pp. 665-697. NACA TM 1301.

Nuclear

APPLICATION OF THE HOLLOW CATHODE SOURCE TO SPECTROGRAPHIC ANALYSIS. PART I: APPARATUS, by F. T. Birks. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Dec 1950. 20f photos, diagrs Mi $1.75, Enl Pr $3.75. PB 104357

1. Cathodes, Water-cooled - Design - Gt. Brit. 2. Spectrographic analysis - Instruments - Gt. Brit. 3. Helium - Spectrographic analysis - Gt. Brit. 4. Argon - Spectrographic analysis - Gt. Brit. 5. Atomic power - Research - Gt. Brit. 6. Micro AERE C/R 601 7. Micro BRR 2/51, Frames 1-19.

Abstract included. Abstract available as PB 104357s. 1p. Mi $1.25, Ph $1.25.

DETECTION OF ALPHA CONTAMINATION WITH SCINTILLATION COUNTERS, by George Cowper. National Research Council of Canada. Atomic Energy Project. Aug 1950. 19p photos, diagrs, graphs Available from National Research Council of Canada, Ottawa, Canada $.20. PB 104995

1. Atomic power - Research - Canada 2. Alpha rays - Detection - Canada 3. Counters, Electronic - Canada 4. NRCC AEP CREL 453 5. NRCC 2390.

MODE-SEPARATION THEORY FOR HEAVILY-STRAPPED MAGNETRONS, by A. W. Aikin. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Aug 1950. 13f diagrs, graphs, tables Mi $1.75, Enl Pr $3.75. PB 104791

1. Atomic power - Research - Gt. Brit. 2. Vacuum tubes, Magnetron - Modulation - Gt. Brit. 3. Micro AERE X/R608 4. Micro BRR 12/51.

Abstract included. Abstract available as PB 104791s. 1p. Mi $1.25, Ph $1.25.

PREPARATION AND USE OF PILE-MADE GAMMA SOURCES FOR INDUSTRIAL RADIOGRAPHY, by W. S. Westwood. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Dec 1950. 10f photos, graphs Mi $1.25, Enl Pr $2.50. PB 104793

1. Atomic power - Research - Gt. Brit. 2. Gamma rays - Gt. Brit. 3. Gamma rays - Sources - Gt. Brit. 4. Gamma rays - Uses - Gt. Brit. 5. Radiography, Industrial - Gt. Brit. 6. Micro AERE I/R638 7. Micro BRR 15/51/

Abstract included. Abstract available as PB 104793s. 1p. Mi $1.25, Ph $1.25. Based on papers read to the International Congress of Radiology and Association for the Advancement of Science in summer 1950.

PREPARATION OF DIBORANE, by F. Hudswell, J.S. Nairn, and K. L. Wilkinson. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jan 1951. 15f photo, diagrs Mi $1.75, Enl Pr $3.75. PB 104792

1. Boron hydrides - Preparation - Gt. Brit. 2. Atomic power - Research - Gt. Brit. 3. Micro AERE C/R 652 4. Micro BRR 13/51.

Abstract included. Abstract available as PB 104792s. 1p. Mi $1.25, Ph $1.25.

STRUCTURAL ENGINEERING

EXTERNAL RENDERED FINISHES FOR WALLS, by G. E. Bessey. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, Eng. Dec 1950. 36p photos, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104742

1. Walls, External - Finishes - Gt. Brit. 2. DSIR NB B10.

Date of title page is 1951. S. O. Code no. 47-549-10*.

FEASIBILITY OF USING MODELS FOR PREDETERMINING NATURAL VENTILATION, by Elmer G. Smith. Texas. Engineering Experiment Station, College Station, Tex. Jun 1951. 26p photos, diagrs, graphs Available from Texas Engineering Experiment Station, College Station, Texas. PB 104799

1. Ventilation - Buildings 2. Air flow - Research 3. Models, Aerodynamic 4. TU EES RR 26.

MORTARS FOR BRICKWORK. Gt. Brit. Ministry of Works. 1951. 4p table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 104743

1. Mortar (Building material) - Strength - Gt. Brit. 2. Brickworks - Gt. Brit. 3. MOW AL 16.

OPTIMUM DISTRIBUTION OF MATERIAL IN SANDWICH PLATES LOADED IN THEIR PLANE, INCLUDING PLATES WITH VARYING MODULUS OF ELASTICITY, by P. P. Bijlaard. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Mar 1950. 54p diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 104812

For a sandwich plate with given weight per unit surface the ratio of the elastic moduli of core and faces which leads to a maximum buckling load is computed. This investigation is carried out for a given ratio between the thicknesses of core and faces as well as for a given total thickness of the sandwich plate. Various cases of loading and boundary conditions are considered. A direct method of calculating the dimensions of a sandwich plate with optimum properties for a given load is presented. Assuming that a material is available for which the elastic modulus varies in proportion to its density, the optimum continuous distribution of this material in a plate, subject to compression or shear in its plane or a combination of both, is investigated. Assuming the same material, the optimum distribution in a plate with 5 different layers with 3 constant moduli of elasticity is computed. It is investigated how a built-up sandwich plate could be constructed according to the computed requirements for the optimum design. In all cases only isotropic materials are considered. CAL SA-247-S-8.

PHOTOELASTIC INVESTIGATION OF STRESS CONCENTRATIONS DUE TO SMALL FILLETS AND GROOVES IN TENSION, by M. M. Frocht. U. S. National Advisory Committee for Aeronautics. Aug 1951. 45p photos, diagrs, graphs, tables Mi $2.50, Ph $6.25. PB 104969

Factors of stress concentration for deep, sharp, and symmetrically arranged grooves and fillets in tension members have been determined photoelastically and are given in this report. Curves are given showing the distribution of the principal stresses on the section through the grooves. Complete isopachic patterns for several basic cases of grooved bars are included. NACA TN 2442.

QUALITATIVE COMPARISON OF RAMMED EARTH AND SUN-DRIED ADOBE BRICK, by Richard Hudson Clough. New Mexico. Engineering Experiment Station, Albuquerque, N. Mex. 1950. 71p photos, diagr, tables Available from Editor of Publications, University of New Mexico, Albuquerque, N. Mex. $1.00. PB 104667

1. Adobes 2. Earth construction 2. Building materials.

University of New Mexico publications in engineering no. 4. Thesis-University of Colorado.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 37) INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-AC-15228 (16528) PREPARED by B. D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Apr 1950. 20f drawing, table Mi $1.75, Enl Pr $3.75. PB 104471

1. Radar - Domes - Materials 2. Sandwich construction - Core materials 3. Coatings, Protective 4. Foams, Chemical - Effect of ultra-violet rays.

GER 451 appx 37. Ref R-09-03-pt. 39. See also PB 104463-104470.

SOME GENERAL CONSIDERATIONS IN THE NATURAL VENTILATION OF BUILDINGS, by William W. Caudill, Sherman E. Crites, Elmer G. Smith. Texas. Engineering Experiment Station, College Station, Tex. Feb 1951. 46p photos, diagrs Available from Texas Engineering Experiment Station, College Station, Texas. PB 104693

1. Ventilation - Buildings 2. TU EES RR 22.

(A) SPÄNNING OCH DEFORMATION HOS EN PLATTA I FORM (A) AV EN CIRKELSEKTORRING, AVERKAD AV GODTYCKLIGT FÖRDELAD TVÄRBELASTNING OCH FRITT UPPLAGD LÄNGS DE RAKA KANTERNA (STRESSES AND DEFLECTION OF A PLATE HAVING THE SHAPE OF THE SECTOR OF A CIRCULAR DISC WITH A CENTRAL HOLE, SUBJECTED TO AN ARBITRARILY DISTRIBUTED LOADING AND FREELY SUPPORTED ALONG THE STRAIGHT EDGES)-(B) STUDIUM AV SPÄNNINGSFÖRDELNINGEN I ETT SFÄRISKT, TRIANGULÄRT SKAL MED RÄTA HÖRNVINKLAR, BELASTAT MED JÄMNT FÖRDELAD YTBELASTNING (INVESTIGATION OF THE STRESS DISTRIBUTION IN A SPHERICAL TRIANGULAR SHELL WITH RECTANGULAR CORNERS WHEN SUBJECTED TO AN EVENLY DISTRIBUTED LOADING ON THE SURFACE), by S. Sjöström. Flygtekniska Försöksanstalten (FFA) Stockholm. 1946. 34p photos, diagrs, graphs, tables (Text in Swedish and English) Mi $2.25, Ph $5.00. PB 104026

1. Stress analysis - Sweden 2. Plates - Stresses - Sweden 3. FFA no. 19.

English summary of each part.

TABLES OF CHARACTERISTIC FUNCTIONS REPRESENTING NORMAL MODES OF VIBRATION OF A BEAM, by Dana Young and Robert P. Felgar, Jr. Texas. University. Bureau of Engineering Research. Jul 1949. 29p tables Available from Bureau of Engineering Research, University of Texas, Austin, Texas. PB 104500

1. Beams - Vibration 2. Characteristic functions 3. TU ERS 44.

University of Texas Publication no. 4913.

TEXTILES AND TEXTILE PRODUCTS

MECHANICS OF ELASTIC PERFORMANCE OF TEXTILE MATERIALS: SOME ASPECTS OF STRESS ANALYSIS OF TEXTILE STRUCTURES, STAPLE-FIBER YARNS, by Milton M. Platt. Fabric Research Laboratories, Inc., Boston, Mass. Apr 1950. 60p graphs, tables, diagrs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $1.50. PB 104794

The study of the influence of textile geometry upon textile structure performance is extended to staple fiber yarns. Methods previously developed for continuous filament yarns (1) are applied to determine the theoretical dependency of staple-yarn tensile characteristics upon the stress-distribution, and modifications thereof introduced by yarn twist, size, staple length, and inherent fiber properties. Both one-time loading to rupture and repeated stress properties of acetate rayon and cotton yarns of various geometries are considered, and comparisons are made between experimental and theoretical data. QMC TSR 62.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

EFFECT OF ASPECT RATIO ON THE LOW-SPEED LATERAL CONTROL CHARACTERISTICS OF UNSWEPT UNTAPERED LOW-ASPECT-RATIO WINGS, by Rodger L. Naeseth and William M. O'Hare. U. S. National Advisory Committee for Aeronautics. May 1951. 47p drawings, graphs, tables Mi $2.50, Ph $6.25. PB 103787

A series of untapered, unswept, complete wings of aspect ratios 1.13, 2.13, 4.13, and 6.13 was investigated at a Mach number of 0.26 to determine the effect of aspect ratio on the lateral control characteristics of the wings equipped with 0.25-chord sealed ailerons of various spans and of various spanwise locations. Design charts are presented for computing aileron effectiveness on low-aspect-ratio, untapered, unswept wings. Experimental values of control effectiveness are compared with values estimated by theoretical methods. NACA TN 2348.

EFFECT OF HORIZONTAL-TAIL SIZE AND TAIL LENGTH ON LOW-SPEED STATIC LONGITUDINAL STABILITY AND DAMPING IN PITCH OF A MODEL HAVING 45° SWEPTBACK WING AND TAIL SURFACES, by Jacob H. Lichtenstein. U. S. National Advisory Committee for Aeronautics. Jun 1951. 32p photo, drawings, graphs, tables Mi $2.25, Ph $5.00. PB 104310

Wind-tunnel results of the effects of horizontal-tail size and length on the low-speed static longitudinal stability and the steady-state rotary damping in pitch for a complete model with wing and tail surfaces having the quarter-chord lines swept back 45° and aspect ratios of 4 are presented. NACA TN 2382.

EXPERIMENTS ON TWO PIERCY AEROFOILS IN THE COMPRESSED AIR TUNNEL, by D. H. Williams, A. H. Bell and W. G. Raymer. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1939. 25p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 103933

1. Wind tunnel tests - Gt. Brit. 2. Reynolds number - Effect - Gt. Brit. 3. Gt. Brit. National Physical Laboratory. Aerodynamics Division 4. ARC RM 2459.

Cover date is 1950. S. O. Code no. 23-2459.

FLIGHT INVESTIGATION OF THE EFFECT OF CONTROL CENTERING SPRINGS ON THE APPARENT SPIRAL STABILITY OF A PERSONAL-OWNER AIRPLANE, by John P. Campbell, Paul A. Hunter, Donald E. Hewes and James B. Whitten. U. S. National Advisory Committee for Aeronautics. Jul 1951. 46p photo, diagrs, graphs Mi $2.50, Ph $6.25. PB 104419

A flight investigation has been conducted on a typical high-wing personal-owner airplane to determine the effect of control centering springs on apparent spiral stability. The centering springs were used in both the aileron and rudder control system to provide both a positive centering action and a means of trimming the airplane. NACA TN 2413.

INDICIAL LIFT AND PITCHING MOMENT FOR A SINKING OR PITCHING TWO-DIMENSIONAL WING FLYING AT SUBSONIC OR SUPERSONIC SPEEDS, by Harvard Lomax, Max A. Heaslet and Loma Sluder. U. S. National Advisory Committee for Aeronautics. Jul 1951. 56p diagrs, tables, graphs Mi $2.75, Ph $7.50. PB 104370

Solutions are presented for the lift and pitching moment on a two-dimensional flat plate undergoing a

step variation in pitch or vertical displacement. Resulting indicial lift and pitching-moment curves are given for free-stream Mach numbers equal to 0, 0.8, 1.0, 1.2, and 2.0. Considerable use is made of the analogy between the boundary values for a two dimensional wing in unsteady motion and those for a three-dimensional, lifting surface in steady motion. NACA TN 2403.

INVESTIGATION INTO THE SUITABILITY OF PROPOSED AIRCRAFT DESIGN MEMORANDA TESTS FOR DECK-LANDING AIRCRAFT, by D. Lean, J.R. Stott, P. A. Hufton and D. Johnson. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1947. 63p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.40. PB 104322

1. Seafire IIc (Airplane) 2. Barracuda II (Airplane) 3. Hellcat I (Airplane) 4. Avenger I (Airplane) 5. Aircraft - Design - Gt. Brit. 6. ARC RM 2407.

Contents: - Part I. Seafire IIe and Barracuda II, by D. Lean and J. R. Stott, with an appendix by P. A. Hufton, p. 1-30. - Part II. Hellcat I and Avenger I, by D. Lean, D. Johnson and J. R. Stott. p. 31-55. Cover date is 1951. S. O. Code no. 23-2407.

K TEORII GORENIA NEPEREMESHANNYKH GAZOV. (ON THE THEORY OF COMBUSTION OF INITIALLY UNMIXED GASES), by Y. B. Zeldovich. Jun 1951. 20p diagrs Mi $1.75, Ph $2.50. PB 104240

Presents theoretical study of laminar diffusion flames. Assuming high rates of chemical reaction with attendant small thicknesses of the reaction zone and no loss of heat by radiation or to cold surfaces, equations are developed for the position of the reaction zone, the distribution of reactants, and the flame temperatures within the reaction zone. The position of the flame surface can also be calculated for various flows of fuel and air and for various heats of combustion of the fuel. Equations are developed for determining the combustion limits of diffusion flames. Translation from Zhurnal Tekhnicheskoi Fiziki, Vol. 19, no. 10, Oct 1949. NACA TM 1296.

METHOD FOR ANALYZING INDETERMINATE STRUCTURES STRESSED ABOVE PROPORTIONAL LIMIT, by F. R. Steinbacher, C. N. Gaylord and W. K. Rey. U. S. National Advisory Committee for Aeronautics. Jun 1951. 39p photos, drawings, graphs, tables Mi $2.25, Ph $5.00. PB 104051

An analytical method based on successive approximations is presented for determining the loads and deflections throughout an indeterminate structure in which one or more of the members have been stressed beyond their proportional limits. Theoretical analyses of three structures are compared with tests and found to agree very closely. For the sake of simplicity and clarity, only coplanar pin-ended structures have been analyzed and tested. NACA TN 2376.

MOMENT AND STRESS DISTRIBUTION IN THIN CYLINDRICAL SHELLS SUBJECTED TO CONCENTRATED LOADS, by S. W. Yuan, V. L. Salerno, and J. Brick. Polytechnic Institute of Brooklyn. Dept. of Aeronautical Engineering and Applied Mechanics. May 1949. 35f diagrs Mi $2.25, Enl Pr $6.25. PB 104218

A study is presented which deals with the distribution of bending moments and membrane stresses in thin-walled cylindrical shells subjected to concentrated loads. The infinite values of internal moments and forces, which are senseless physically and therefore useless for the engineer, were obviated through the assumption of a small but finite arch upon which the so-called concentrated load was distributed. The solution which has been obtained for the uniform load may be used as a very close approximation to that for the concentrated load, by distributing the uniform load over a small finite area. The expressions for the stress resultants at the center of the area carrying the uniform load, unlike the corresponding expressions for the concentrated load, give finite values. Report no. 1 on Contract N6onr-263, Task order VII. PIB AL 153.

NOTE ON THE LIFT AND PROFILE DRAG EFFECTS OF SPLIT AND SLOTTED FLAPS, by A. D. Young and P. A. Hufton. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Sep 1941. 20p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 104328

The existing data have been analysed and a method has been derived for predicting the lift and profile-drag increments of split and slotted flaps. It is suggested that the probable order of error involved in the method is within the accuracy required for most practical purposes. It is found that the profile-drag increments of split flaps on wing-body combinations is somewhat lower than on wings alone, whilst the converse is true for slotted flaps. It is suggested that this may be due to wing-body-flap interference effects. Nevertheless, the available data from which these results are derived are scanty and most are comparatively unreliable; further systematic tests are needed before definite conclusions can be drawn. S. O. Code no. 23-2545. ARC RM 2545.

NOTE ON WIND-TUNNEL MEASUREMENTS OF YAWING MOMENT, RUDDER FIXED AND FREE, ON MODELS OF THREE AIRCRAFT, by J. E. Adamson, E. C. Brown and R. H. Allen. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1941. 16p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 103935

1. Stability, Lateral - Yaw effect - Gt. Brit. 2. Rudders, Aircraft - Fixed - Gt. Brit. 3. Airplanes - Yaw - Gt. Brit. 4. Wind tunnel tests - Gt. Brit. 5. Yawing moments - Gt. Brit. 6. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 7. ARC RM 2534.

Cover date is 1951. S. O. Code no. 23-2534.

O PODYOMNOY SILE KRILA KONECHNOGO RAZMAHA V SVERHZVOOKOVOM POTOKE (LIFT FORCE OF A WING OF FINITE SPAN IN SUPERSONIC FLOW), by S. V. Falkovich. Jan 1949. 12p Mi $1.75, Ph $2.50. PB 104234

1. Wings, Trapezoidal - Lift - Russia 2. Flow, Supersonic - Theory - Russia 3. Brown University. Graduate Division of Applied Mathematics 4. GDAM A9-T-23 5. AAF T-2 T/1205-1A.

Translated from Applied Math. and Mech., vol. XI, p. 171-176 (1947) by the Graduate Division of Applied Mathematics, Brown University for Air Materiel Command, Technical Intelligence Division under Contract W33-038-ac-15004 (16351).

PRACTICAL METHODS OF CALCULATION INVOLVED IN THE EXPERIMENTAL STUDY OF AN AUTOPILOT AND THE AUTOPILOT-AIRCRAFT COMBINATION, by Louis H. Smaus and Elwood C. Stewart. U. S. National Advisory Committee for Aeronautics. Jun 1951. 25p diagrs, graphs Mi $2.00, Ph $3.75. PB 104056

Practical methods are presented for making the various calculations required for the analysis of an autopilot and an autopilot-aircraft combination from frequency-response data. Equations are derived for determining the servo-system error voltage for both displacement input signal and displacement plus rate of displacement input signal, the autopilot frequency response for addition of rate of displacement input signal, the servo-system frequency response for a change of gain, and the relation between open-loop and closed-loop frequency responses for the servo system and for the autopilot-aircraft combination. NACA TN 2373.

PULSE METHOD FOR THE DETERMINATION OF AIRCRAFT DYNAMIC PERFORMANCE, by R. C. Seamans, B. P. Blasingame, and G. C. Clementson. Massachusetts Institute of Technology. Instrumentation Laboratory. Apr 1949. 80f photos, drawings, diagrs, graphs Mi $3.50, Enl Pr $11.25. PB 104225

A method is outlined for evaluating an aircraft dynamic test involving the response of the aircraft to an applied displacement of the control surfaces. It is shown that the relationship can be expressed mathematically by means of a concept called a "performance operator," and that, with selected types of control surface motion of common occurrence, the response can be related to the applied displacement more simply by means of a "performance function." The general characteristics of the performance operator and the performance function are outlined with a discussion of a technique which permits the performance function of an aircraft to be determined from knowledge of its response to a pulse of less than one-second duration. The performance function of a B-25 bomber obtained by this technique, is correlated with the performance function computed from stability derivatives.

RECTANGULAR-WIND-TUNNEL BLOCKING CORRECTIONS USING THE VELOCITY-RATIO METHOD, by Rudolph W. Hensel. U. S. National Advisory Committee for Aeronautics. Jun 1951. 40p diagrs, graphs Mi $2.25, Ph $5.00. PB 104246

Calculations of the ratios of the velocity increments at test bodies to those at the tunnel walls caused by the solid blocking of these bodies within the walls of a closed rectangular wind tunnel are presented. The bodies treated include two-dimensional airfoils; small bodies of revolution; straight, untapered, finite-span wings of varying span; and swept, untapered, finite-span wings of varying span. It is shown that, after wake blocking effects have been removed, the present method furnishes semi-empirical blocking corrections for most wind-tunnel models and their components. The test-section proportions of the Southern California Cooperative Wind Tunnel at CIT (ratio of height to width equal to $1/\sqrt{2}$) are used in the calculations. NACA TN 2372.

SINGLE-DEGREE-OF-FREEDOM-FLUTTER CALCULATIONS FOR A WING IN SUBSONIC POTENTIAL FLOW AND COMPARISON WITH AN EXPERIMENT, by Harry L. Runyan. U. S. National Advisory Committee for Aeronautics. Jul 1951. 27p Mi $2.00, Ph $3.75. PB 104339

The effect of Mach number and structural damping on single-degree-of-freedom pitching of a wing is presented. Some experimental results are compared with theory and good agreement is found for certain ranges of an inertia parameter. NACA TN 2396.

SKIN FRICTION AND HEAT TRANSFER CHARACTERISTICS OF A LAMINAR BOUNDARY LAYER ON A CYLINDER IN AXIAL FLOW, by R. A. Seban and R. Bond. California. University. Dept. of Engineering, Berkeley, Calif. Aug 1949. 26f graphs Mi $2.00, Enl Pr $5.00. PB 104221

The problem of skin friction and heat transfer characteristics are considered relative to the flow of an incompressible fluid of constant properties along a right circular cylinder, the cylinder axis being parallel to the stream. It is visualized that a laminar boundary layer begins with zero thickness at the leading edge of the cylinder, and the characteristics of this boundary layer are discussed. This system differs from the laminar boundary layer on a flat plate only in the curvature of the surface, and the significant results are found to be expressible as ratios with respect to the similar quantities evaluated for the flat plate system. Report no. 8 on Contract no. W33-038-ac-15229.

STRESS ANALYSIS CRITERIA, F84E AIRPLANE, by V. M. Zadikov and A. Epstein. Republic Aviation Corp., Farmingdale, N. Y. Revision A. Dec 1949. 161f diagrs, graphs, tables Mi $6.25, Enl Pr $22.50. PB 104197

Stress analysis criteria are presented for the F-84E fighter airplane, a modified version of the F-84. The longer range is achieved by additional fuel tanks in the fuselage and larger tip tanks. The better performance is attained by use of the new Allison J-35-A-17 engine of 4000 lb estimated average thrust. The highest vertical tail load occurs at 5^{o} yaw with zero rudder deflection, and is 5,430 lb limit. The loading over the aileron is assumed to be reduced by 40% yielding a hinge moment of -2300 x .60 = 15,000 in. lb, giving an aileron up-float of -4.8^{o}. Report no. E28-1A.

STRUCTURAL PORBLEMS IN DESIGN OF THIN WINGS OF HIGH SOLIDITY. PART I: STRESS RELATIONS IN OBLIQUE COORDINATES, by Arthur S. Benson, Alfred S. Niles, and W. Flügge. U. S. Air Materiel Command. Engineering Division. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1950. 59p photos, drawings, graphs, tables Mi $2.75, Ph $7.50. PB 104155

The equations of equilibrium for the stresses at a point, the general differential equations of equilibrium, and expressions for elastic strain-energy and curvature were developed, using a system of "oblique" coordinates. The initial steps include the development of relations between the coordinates of a point and between the stresses in superimposed orthogonal and oblique reference systems. These relations are then combined with the classical equations of the theory of elasticity, to express them in terms of the oblique coordinate system. Contents: - Stress relations in oblique coordinates, by Arthur S. Benson and Alfred S. Niles, Contract W33-038-ac-16697, Technical Report no. 1, p. 1-21. - Bending and tor-

sion of a rhomboidal cantilever plate, by Arthur S. Benson and Alfred S. Niles, Contract W33-038-ac-16697, Technical report no. 2, p. 23-52. - Numerical study of a trapezoidal panel, by W. Flügge, Contract W33-038-ac-16697, Technical report no. 12, p. 53-56. AAF TR 5795, part I.

TESTS ON A. W. APOLLO (BRAB IIB) IN THE N.P.L. COMPRESSED AIR TUNNEL, by C. Salter, C.J.W. Miles and P. S. Pusey. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Dec 1949. 37p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.60. PB 104010

1. Propellers - Wind tunnel tests - Gt. Brit. 2. Wind tunnel tests - Gt. Brit. 3. A. W. Apollo (Brab IIB (Airplane) 4. Brab IIB (Airplane) 5. IIB (Airplane) 6. Armstrong Whitworth Aircraft, Ltd. 7. Gt. Brit. National Physical Laboratory. Aerodynamics Division 8. ARC CP 40.

Cover date is 1951. S. O. Code no. 23-9006-40.

TESTS ON THICK CUFF SECTIONS IN THE COMPRESSED AIR TUNNEL, by D. H. Williams and A. F. Brown. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1942. 8p drawing, graphs, table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 103687

Tests have been carried out on symmetrical aerofoils, 40 per cent, and 50 percent, thick, and on a 40 per cent. thick aerofoil with 10 per cent. camber. Cover date is 1951. ARC RM 2457.

THREE PAPERS FROM CONFERENCE ON "WING AND TAIL-SURFACE OSCILLATIONS", MARCH 6-8, 1941, MUNICH, by H. Söhngen and others. Aug 1951. 45p diagrs, graphs, tables Mi $2.50, Ph $6.25. PB 104866

1. Wings - Controls - Germany 2. Wings - Flutter - Germany 3. Wings - Vibration - Germany 4. Tail surfaces - Aerodynamics - Germany 5. Ailerons - Flutter - Germany 6. Control surfaces - Aerodynamics - Germany 7. NACA TM 1306 8. LG B 135, p. 61-74, trans.

Translations from Lilienthal-Gesellschaft für Luftfahrtforschung, Bericht 135, March 1941, p. 61-74. Contents: I. Bemerkung zum aerodynamisch innenausgeglichenen ruder. (Remarks concerning aerodynamically balanced control surfaces), by H. Söhngen. 1941. (From Lilienthal-Gesellschaft für Luftfahrtforschung, Bericht 135, p. 61-65.). p. 3-15. - II. Aerodynamische ersatzsysteme für verschiedene ruder formen im rahmen der zweidimensionalen tragflächentheorie. (Aerodynamically equivalent systems for various forms of control surfaces within the scope of the two-dimensional wing theory, by L. Schwarz. 1941. (From Lilienthal-Gesellschaft für Luftfahrtforschung, Berich 135, p. 65-70). p. 17-34. - III. Vergleichsrechnungen zum aerodynamischen ruderinnenausgleich. (Comparative calculations concerning aerodynamic balance of control surfaces), by F. Dietze 1941. (From Lilienthal-Gesellschaft für Luftfahrtforschung, Bericht 135, p. 70-74). p. 35-41.

TORSIONAL STRENGTH OF STIFFENED D-TUBES, by E. S. Kavanaugh and W. D. Drinkwater. U. S. National Advisory Committee for Aeronautics. May 1951. 43p photos, graphs, tables Mi $2.50, Ph $6.25. PB 103786

Covers a series of torsional tests on stiffened D-tubes of alclad 24S-T3 aluminum alloy having a cross section similar to the NACA 0012 airfoil section and a closing web at 30 percent of the chord. The stiffeners consisted of ribs and stringers. An average-strength chart has been developed for this type of structure that takes into account the skin thickness, rib spacing, and stringer spacing. This chart may also be used for unstiffened D-tubes. Measurements of unit twist and unit strain were made at a number of points on most of the specimens. NACA TN 2362.

TURBULENCE-INTENSITY MEASUREMENTS IN A JET OF AIR ISSUING FROM A LONG TUBE, by Barney H. Little, Jr. and Stafford W. Wilbur. U. S. National Advisory Committee for Aeronautics. May 1951. 28p photos, diagrs, graphs, tables Mi $2.00, Ph $3.75. PB 103853

An investigation was made of the longitudinal and radial turbulence intensity in a subsonic jet issuing from a pipe in which fully developed flow was established. This jet was bounded by an annular air jet having a maximum velocity equal to the mean velocity of the inner pipe. Reynolds number was varied from 20,000 to 120,000, and surveys were taken from the exit to an axial distance of 5 diameters. Velocity profiles and radial and longitudinal turbulence-intensity profiles are presented for four different Reynolds numbers and three distances from pipe exit. At the pipe exit the turbulence was not isotropic. Radial components of turbulence did not vary in magnitude. Longitudinal components increased with increasing Reynolds number and decreased in the mixing region with increasing distance from the pipe exit. NACA TN 2361.

USE OF RUBBER MODELS IN STRESS INVESTIGATIONS, by D. Williams, R. D. Starkey, D.M.A. Leggett and others. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1942. 22p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 104401

1. Airplanes - Stress analysis - Gt. Brit. 2. Elasticity - Theory - Gt. Brit. 3. Sheet metal - Stresses - Gt. Brit. 4. Rubber - Elasticity - Gt. Brit. 5. Poisson's ratio - Gt. Brit. 6. Model testing - Gt. Brit. 7. Airplanes - Models, Rubber - Gt. Brit. 8. ARC RM 2433.

Cover date is 1951. S. O. Code no. 23-2433. Contents: - Part I. Description of a proposed method and discussion of the theoretical considerations involved, by D. Williams. p. 2-6. - Part II. Use of method to explore stresses around holes in flat sheet under tension, by R. D. Starkey and F. Grinsted. p. 7-16. - Part III. Use of method for stress investigation of two new types of problem, by D.M.A. Leggett and R.P.N. Jones. p. 17-22.

VAPORIZATION RATES AND HEAT-TRANSFER COEFFICIENTS FOR PURE LIQUID DROPS, by Robert D. Ingebo. U. S. National Advisory Committee for Aeronautics. Jul 1951. 32p diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104368

The effect of air temperature on vaporization rates of nine pure liquid drops was determined by means of a heat-balance equation. Experimentally evaluated heat-transfer coefficients were found to correlate an expression for relating a new dimensionless number, Re·Sc, and the thermal conductivity ratio k_a/k_v

to the Nusselt number for heat transfer. Surface temperatures were determined for the nine pure liquid drops; nitrobenzene, n-octane, benzene, methanol, acetone, water, ethanol, butanol, and carbon tetrachloride. These temperatures were found to be approximately equal to wet-bulb temperatures and a new method of approximating wet-bulb temperatures from boiling-point data and wet-bulb data for water was developed. NACA TN 2368.

WIND-TUNNEL INVESTIGATION AND ANALYSIS OF THE EFFECTS OF END PLATES ON THE AERODYNAMIC CHARACTERISTICS OF AN UNSWEPT WING, by Donald R. Riley. U. S. National Advisory Committee for Aeronautics. Aug 1951. 55p photo, diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 104967

Wind-tunnel results on end-plate effects on the aerodynamic characteristics of an unswept and untapered wing of aspect ratio 4 are presented, and experimental values of the end-plate effects on the lift-curve slope and induced drag are determined and compared with theory. Expressions are developed for the lift-drag and maximum lift-drag ratios and results compared with calculated values. A theoretical analysis is presented to indicate the effect of factors influencing the lift-drag and maximum lift-drag characteristics. NACA TN 2440.

WIND-TUNNEL INVESTIGATION OF FIN AND RUDDER ACCIDENTS ON HEAVY BOMBERS (HALIFAX AND LANCASTER), by C. H. E. Warren and J. A. Kirk. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1943. 27p drawings, graphs, tables (1 fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 104325

1. Halifax (Bombers) 2. Lancaster (Bombers) 3. Wind tunnel tests - Gt. Brit. 4. Airplanes - Fins - Wind tunnel tests - Gt. Brit. 5. Rudders, Aircraft - Wind tunnel tests - Gt. Brit. 6. Airplanes, Bomber - Wind tunnel tests - Gt. Brit. 7. ARC TM 2479.

Cover date is 1951. S. O. Code no. 23-2479.

WIND-TUNNEL TESTS ON THE EXPERIMENTAL HIGH LIFT M.18, by R. Hills, E. C. Brown, M. A. Morrison and H. V. Becker. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1942. 13p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 103932

1. M.18 (Airplane) 2. Wind tunnel tests - Gt. Brit. 3. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 4. ARC RM 2453.

Cover date is 1951. S. O. Code no. 23-2453.

WIND-TUNNEL TESTS ON THE SHETLAND, by C.H.E. Warren and R.E.W. Harland. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1942. 25p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 103938

1. Shetland (Airplane) 2. Short-Saro R.14/40 (Airplane) 3. R.14/40 (Airplane) 4. Wind tunnel tests - Gt. Brit. 5. ARC RM 2571.

Cover date is 1951. S. O. Code no. 23-2571.

WIND-TUNNEL TESTS ON THE SUPERMARINE S.24/37, A HIGH-WING MONOPLANE WITH A VARIABLE-INCIDENCE WING, by H. Davies, J. E. Adamson and J. Seddon. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1941. 39p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.60. PB 103931

1. Supermarine S.24/37 (Airplane) 2. S.24/37 (Airplane) 3. Wind tunnel tests - Gt. Brit. 4. Wings, Variable-incidence - Gt. Brit. 5. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 6. ARC RM 2451.

Cover date is 1951. S. O. Code no. 23-2451.

WIND SECTIONS WITH MINIMUM DRAG AT SUPERSONIC SPEEDS, by Georg Drougge. Flygtekniska Försöksanstalten (FFA) Stockholm. 1949. 15p graphs, tables Mi $1.75, Ph $2.50. PB 104031

1. Wings - Drag - Sweden 2. Wing profiles - Pressure distribution - Sweden 3. Wing profiles - Design - Sweden 4. Flow, Supersonic - Sweden 5. FFA no. 26.

X-1D AIRPLANE SAFETY INSPECTION, by Fred R. Heckerman. U. S. Air Development Force. Research Division, Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 3p Mi $1.25, Ph $1.25. PB 104065

1. X-1D (Airplane) 2. Airplanes - Inspection 3. Airplanes - Oxygen system 4. Oxygen systems - Tests 5. Bell Aircraft Corp., Buffalo, N. Y. 6. AAF TSEAA-MR-S2-8.

DCRDE-S2-8.

Instruments

DISTORTION OF CONTROL SURFACE PANELS, by D.M.A. Leggett and R. G. Chapman. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1944. 30p photos, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 104406

This report provides data for the design of control surface panels of any required rigidity, flight experience having shown that distortion of control surface panels, due to airloads, often has a serious effect on the pilot's operating force in the case of large or high-speed aircraft. The report falls naturally into two parts. Part I is purely theoretical and contains estimates of the distortion that is likely to occur with different types of construction and for various aerodynamic loading. Part II is primarily experimental and consists of a detailed account of tests made on various types of control surface. The experimental results described in Part II show that the theoretical estimates given in Part I for the distortion of fabric panels under uniform pressure lie between 100 per cent. and 125 per cent. of the practical values. For metal panels the same accuracy can be obtained for pressures above 2 lb./in. , but below this pressure, the simple theory developed in Part I is inadequate, owing to the presence of intercostal or spanwise stringers and to lack of rigidity of the edge members. Theory and experiment indicate that for panels under a triangular chordwise pressure distribution, the deflection at a point where the linearly varying pressure is p, is almost the same as the deflection of the same point when the pressure p is uniform. Theoretical estimates of the deflection of such points are, therefore, of the same order or accuracy as those relating to panels under uniform pressure. On the basis that panel distortion due to given aerodynamic loading is

not to exceed some specified amount, the results given in this report suggest that of available cover materials, fabric provides the lightest structure. The results also suggest that closely spaced ribs, or ribs and intermediate chordwise stringers, constitute a more efficient method of reinforcing the cover than ribs and stringers. At the end of the report a comparison is made between the theoretical estimates of Part I and the experimental results of Part II. Cover date is 1951. S. O. Code no. 23-2478. ARC RM 2478.

EFFECT OF AN AUTOPILOT SENSITIVE TO YAWING VELOCITY ON THE LATERAL STABILITY OF A TYPICAL HIGH-SPEED AIRPLANE, by Ordway B. Gates, Jr. and Leonard Sternfield. U. S. National Advisory Committee for Aeronautics. Sep 1951. 29p diagr, graphs, tables Mi $2.00, Ph $3.75. PB 104992

Calculations have been made to determine the effect of an autopilot sensitive to yawing velocity on the lateral stability of a fighter airplane designed for transonic or supersonic speeds. The effects of inclination of the gyro reference axis and of time lag in the autopilot are discussed. Airplane motions in sideslip subsequent to a disturbance in sideslip are also presented for several representative flight conditions. NACA TN 2470.

FH-1 ELEVATOR INVESTIGATIONS, by C. James. Cornell Aeronautical Laboratory, Buffalo, N. Y. Jun 1951. 37p drawings, diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104959

1. FH-1 (Elevator control system) 2. Elevators, Aircraft - Controls.

FRM no. 122.

FLIGHT BY PERISCOPE. I: PERFORMING AN INSTRUMENT FLIGHT PATTERN; THE INFLUENCE OF SCREEN SIZE AND IMAGE MAGNIFICATION, by Stanley N. Roscoe. Illinois. University. Institute of Aviation, Urbana, Ill. Mar 1951. 46p photos, diagr, graphs, tables Available from University of Illinois Institute of Aviation, Urbana, Ill. PB 104577

1. Periscopes, Aircraft 2. Flying, Instrument 3. Screens, Projection.

Aeronautics bulletin no. 9. University of Illinois bulletin v. 48, no. 55. Contract N6ori-71, T. O. XVI.

INSTALLATION OF THE SOLAR PILOT DIRECTOR IN THE LINK CELESTIAL NAVIGATION TRAINER, by J. W. Whelan. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Nov 1950. 15p drawings (1 fold) Mi $1.75, Ph $2.50. PB 104441

1. Galvanometers - Controls - Canada 2. Driftmeters - Canada 3. Fuselages - Design - Canada 4. Photography, Aerial - Equipment - Canada 5. B3 (Driftmeter) 6. Link trainers - Instruments - Canada 7. RCAF EPE 953.

Cover date is February 1951. RCAF development report: Final D24-7/50. Reference: AMTS Directive 2-50 dated 31st January 1950. Issued by AMTS.

SOME WIND-TUNNEL DEVELOPMENTS OF THE SPOILER AS A FORM OF LATERAL CONTROL, by W. S. Coleman and G. H. Tidbury. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1942. 20p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 104331

1. Spoilers - Effect on aileron control 2. Spoilers - Wind tunnel tests - Gt. Brit. 3. Spoilers, Circular arc - Hinge moments - Gt. Brit. 4. Control surfaces, Lateral - Wind tunnel tests - Gt. Brit. 5. ARC RM 2586.

Cover date is 1951. S. O. Code no. 23-2586.

TESTS ON THE EFFECT OF INCIDENCE ON SOME PRESSURE HEADS AT HIGH SUBSONIC SPEEDS, by E.W.E. Rogers and C. J. Berry. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1950. 13p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104011

1. Pitot tubes - Wind tunnel tests - Gt. Brit. 2. Pitot-static tubes - Wind tunnel tests - Gt. Brit. 3. Wind tunnel tests - Gt. Brit. 4. Venturi-shrouded pitot (Tube) 5. MK VIIIA (Pitot-static head) 6. MK VIIIB (Pitot-static head) 7. VIIIA (Pitot-static head) 8. VIIIB (Pitot-static head) 9. Gt. Brit. National Physical Laboratory. Aerodynamics Division 10. ARC CP 41.

Cover date is 1951. S. O. Code no. 23-9006-41.

THEORETICAL STUDY OF SOME METHODS FOR INCREASING THE SMOOTHNESS OF FLIGHT THROUGH ROUGH AIR, by William H. Phillips and Christopher C. Kraft, Jr. U. S. National Advisory Committee for Aeronautics. Jul 1951. 98p Mi $4.25, Ph $12.50. PB 104639

An analysis has been made of the response to gusts and the stability and control characteristics of an airplane equipped with various devices to reduce accelerations due to rough air. Various methods of control are considered but the main emphasis is placed on systems in which flaps on the wing are operated through an automatic control device sensitive to angle of attack or acceleration. The flap characteristics required to give satisfactory results are derived. Examples are presented showing the effectiveness of various systems for reducing the accelerations due to gusts. NACA TN 2416.

Engines and Propellers

ANALYSIS OF THRUST AUGMENTATION OF TURBOJET ENGINES BY WATER INJECTION AT COMPRESSOR INLET INCLUDING CHARTS FOR CALCULATING COMPRESSION PROCESSES WITH WATER INJECTION, by E. Clinton Wilcox and Arthur M. Trout. U. S. National Advisory Committee for Aeronautics. 1951. 23p graphs Available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. $.25. PB 104748

A psychrometric chart having total pressure (sum of partial pressures of air and water vapor) as a variable, a Mollier diagram for air saturated with water vapor, and charts showing the thermodynamic properties of various air-water vapor and exhaust gas-water vapor mixtures are presented as aids in calculating the thrust augmentation of a turbojet engine resulting from the injection of water at the compressor inlet. Curves are presented that show the theoretical performance of the augmentation method for various amounts of water injected and the effects of varying flight Mach number, altitude, ambient-air temperature, ambient relative humidity, compressor pressure ratio, and inlet-diffuser efficiency. Numerical examples, illustrating the use of the psychrometric chart and the Mollier diagram in calculating both

compressor inlet and compressor outlet conditions when water is injected at the compressor inlet, are presented. Supersedes NACA TN 2104(PB 110351) and NACA TN 2105 (PB 110431). NACA Rept. 1006.

INVESTIGATION OF TWIN FUEL SYSTEMS ON AN AIRCRAFT ENGINE, TWIN FUEL INJECTORS, by James G. McClure. Texas. Engineering Experiment Station, College Station, Tex. Jul 1951. 32p photos, diagrs, graphs Available from Texas Engineering Experiment Station, College Station, Tex. PB 104801

1. Engines, Aircraft - Fuel systems 2. Airplanes - Induction systems 3. TU EES RR27.

METHOD OF ANALYSIS FOR COMPRESSIBLE FLOW PAST ARBITRARY TURBOMACHINE BLADES ON GENERAL SURFACE OF REVOLUTION, by Chung-Hua Wu and Curtis A. Brown. U. S. National Advisory Committee for Aeronautics. Jul 1951. 42p diagrs, graphs Mi $2.50, Ph $6.25. PB 104536

A method of bbtaining the flow of a nonviscous compressible fluid past compressor and turbine blades on a general surface of revolution by the use of differentiation coefficients for unequally spaced grid points is given. Solutions by the relaxation method for hand computation and the matrix method with machine computation are discussed. Detailed flow variations in a typical turbine cascade of highly cambered thick blades are obtained by this method. The variation of the fluid state across the channel is examined and the flow on the mean streamline is analyzed. The velocity distribution around the blade compares very well with experimental data. NACA TN 2407.

METHOD OF DESIGNING TURBOMACHINE BLADES WITH A DESIRABLE THICKNESS DISTRIBUTION FOR COMPRESSIBLE FLOW ALONG AN ARBITRARY STREAM FILAMENT OF REVOLUTION, by Chung-Hua Wu and Curtis A. Brown. U. S. National Advisory Committee for Aeronautics. Sep 1951. 45p diagrs, graphs Mi $2.50, Ph $6.25. PB 104975

A rapid method for designing turbomachine blades of a given turning and a desirable blade-thickness distribution for a compressible nonviscous fluid flow along an arbitrary stream filament of revolution is presented. The method is illustrated with the design of several turbine cascades of highly cambered thick blades. The determination of the shape of the blades and the compressible flow past the blades was carried out by hand computation in 16 hours. Because the surface of revolution, on which the blades are located, is completely arbitrary, the method can be applied to axial-flow, radial-flow, and mixed-flow turbomachines. The variation in the normal distance between the stream surfaces of revolution can be taken into account, thus incorporating into the design the principal effect of three-dimensional flow. The method is readily applied to the design of channels on a plane and on a general surface of revolution. NACA TN 2455.

PROPELLER BLADE ANGLE METER, by L. C. Pingel. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Aug 1950. 20p photos, fold drawings, diagr Mi $1.75, Ph $2.50. PB 104442

1. Instruments, Measuring - Propeller pitch - Canada 2. Propellers - Pitch - Measurements - Canada 3. Meters, Propeller pitch angle - Canada 4. RCAF EPE 961.

Cover date is January 1951. RCAF development report: Final D1-1. Reference: AMTS Directive number 1-48 dated 2 March, 1948. Issued by AMTS.

THRUST METHOD OF AIRCRAFT PERFORMANCE ESTIMATION, by D. A. MacLulich. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Aug 1950. 30p graphs Mi $2.00, Ph $3.75. PB 104443

The Thrust Method, as developed at the R. C. A. F. Experimental and Proving Establishment, is characterized by dealing with basic aerodynamic factors in pounds of thrust and drag and other forces. It involves the analysis of the effects of certain factors on the over-all propulsive efficiency. The method of measuring drag by gravitational force in glides is worked out so as to be effective and accurate. From an organized small set of flight tests the performance of the aircraft in the configuration used may be estimated for any height, power, speed and weight. Some considerations affecting the accuracy of estimation of performance are discussed. Cover date is Apr 1951. RCAF development report: Final D66/2. Reference: AMTS directive 18-46 dated 29th October 1946. Issued by AMTS. RCAF EPE 963.

Training and Training Devices

EVALUATION OF THE SCHOOL LINK AS AN AID IN TEACHING GROUND REFERENCE MANEUVERS, by Edward L. Brown, William G. Matheny, Ralph E. Flexman. Illinois. University. Dept. of Psychology. Dec 1950, 35p graphs, tables Mi $2.25, Ph $5.00. PB 104999

1. Link trainers 2. Pilots, Air - Training equipment 3. SDC TR 71-16-7.

SDC Human Engineering Project 20-L-1. Contract N6 ori-71, T. O. XVI, project designation NR-784-003.

HUMAN ENGINEERING FOR AN EFFECTIVE AIR-NAVIGATION AND TRAFFIC-CONTROL SYSTEM, by Paul M. Fitts. Ohio State University Research Foundation, Columbus, Ohio. Mar 1951. 104p drawings, tables Mi $4.50, Ph $13.75. PB 104669

1. Airports - Air traffic control 2. Navigation, Aerial - Training 3. Navigation, Aerial - Visual aids 4. Communication systems, Audio 5. Psychology, Applied 6. Psychology, Aviation 7. U. S. Air Navigation Development Board 8. National Research Council. Committee on Aviation Psychology.

A report prepared for the Air Navigation Development Board by the Ohio State University Research Foundation under the auspices of the NRC Committee on Aviation Psychology.

SUMMARY OF FLIGHT LOAD DATA RECORDED IN TACTICAL AND TRAINING OPERATIONS DURING THE PERIOD OF WORLD WAR II, by Lawrence B. Reynolds. U. S. Air Materiel Command. Engineering Division. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1949. 18f graphs Mi $1.75, Enl Pr $3.75. PB 104224

A total of approximately 105,000 flight hours was recorded by AMC in combat and training operations during World War II to determine flight-load data to be used in formulating structural-design criteria for future aircraft. On fighter aircraft, greater flight

loads were obtained in training than in combat operations, although on bomber aircraft no outstanding difference existed between the loads in the two types of operations. Greater flight loads were encountered in low-level bombing attacks than in high-level bombing attacks. Indications are that on the average slightly higher loads can be expected on fighter aircraft in the future.

Aerodynamics

APPLICABILITY OF THE HYPERSONIC SIMILARITY RULE TO PRESSURE DISTRIBUTIONS WHICH INCLUDE THE EFFECTS OF ROTATION FOR BODIES OF REVOLUTION AT ZERO ANGLE OF ATTACK, by Vernon J. Rossow. U. S. National Advisory Committee for Aeronautics. Jun 1951. 28p diagrs, graphs Mi $2.00, Ph $3.75. PB 104290

By comparing theoretical pressure distributions which include rotation effects, the hypersonic similarity rule is shown to be applicable to rotational as well as irrotational flow. The influence of rotation on pressure distribution was shown to be a function of the similarity parameter only, for ogive cylinders. Charts are presented for rapid determination of pressure distributions over ogive cylinders for a wide range of Mach numbers and fineness ratios. NACA TN 2399.

APPLICATIONS OF X-RAY ABSORPTION TO MEASUREMENT OF SMALL AIR-DENSITY GRADIENTS, by Ruth N. Weltmann, Steven Fairweather and Daryl Papke. U. S. National Advisory Committee for Aeronautics. Jul 1951. 36p photos, diagrs, graphs Mi $2.25, Ph $5.00. PB 104341

An analysis of two X-ray absorption methods for determining small air-density gradients is presented. One of the methods is successfully applied to the evaluation of a 6-percent density gradient of a flat-plate boundary layer of about 0.024-inch thickness in a two-dimensional channel. In the other method, divergence of the X-ray beam passing the absorber poses a problem. A solution is postulated. Example calculations of the expected sensitivity in boundary-layer density measurement are given for X-ray parameters selected for optimum operation. NACA TN 2406.

COMPARISON BETWEEN EXPERIMENTAL MEASUREMENTS AND A SUGGESTED FORMULA FOR THE VARIATION OF TURBULENT SKIN-FRICTION IN COMPRESSIBLE FLOW, by R. J. Monaghan. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1950. 24p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 104698

1. Airplanes - Skin - Friction - Gt. Brit. 2. Flow, Compressible - Measurements - Gt. Brit. 3. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 4. ARC CP 45.

Technical note no. Aero 2037. Cover date is 1951. S. O. Code no. 23-9006-45.

CONSIDERATIONS ON THE STRUCTURE OF MIXED SUBSONIC-SUPERSONIC FLOW PATTERNS (PROJECT NO. HA-219), by Dr. K. Gottfried Guderley. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1947. 94p diagrs Mi $4.25, Ph $12.50. PB 104237

This report analyses transonic flow patterns by tracing their images in the hodograph plane. Since the mapping is subject to restrictions, this procedure reveals essential features of the physical flow patterns and thus may improve the understanding of mixed subsonic-supersonic flows. For Mach numbers close to 1, shocks in a parallel stream can also be included in these considerations. Among the questions dealt with are: the transition from a subsonic free jet to a supersonic free jet, the detachment of a shock from a wedge in supersonic flow, and the physical discussion of α-shocks. On this occasion a new type of α-shock was found. Details of the flow patterns are investigated mathematically. The numerous examples show that the transition to flow patterns of different types is continuous. Therefore conditions where the character of the flow pattern is changing need not be critical. AAF TR 2168 ND.

EVALUATION OF THE REDUCED-MASS METHOD OF REPRESENTING WING-LIFT EFFECTS IN FREE-FALL DROP TESTS OF LANDING GEARS, by Benjamin Milwitzky and Dean C. Lindquist. U. S. National Advisory Committee for Aeronautics. Jul 1951. 43p photo, diagrs, tables Mi $2.50, Ph $6.25. PB 104418

The results of reduced-mass drop tests of a small landing gear are compared with data obtained in simulated air-borne impacts and free-fall drop tests with the full weight over a range of vertical velocities. In the reduced-mass drop tests, values of load factor and ratio of strut energy to impact energy were in fairly good agreement with the data for simulated air-borne impacts, values of impact period and shock-strut effectiveness were generally low, and values of stroke and mass travel were high. In the free-fall drop tests with the full weight, the values of load factor, impact period, stroke, mass travel, and impact energy were excessive; the values of shock-strut effectiveness, however, closely approximated those obtained in the simulated air-borne impacts. NACA TN 2400.

FIRST REPORT OF THE INTERDEPARTMENTAL HELICOPTER COMMITTEE, SEPTEMBER 1950. Gt. Brit. Ministry of Civil Aviation. 1951. 30p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35. PB 103924

1. Helicopters - Aerodynamics - Gt. Brit. 2. MCA P 92.

George Cribbett, Chairman. S.O. Code no. 22-205.

HEAT DELIVERY IN A COMPRESSIBLE FLOW AND APPLICATIONS TO HOT-WIRE ANEMOMETRY, by Chan-Mou Tchen. U. S. National Advisory Committee for Aeronautics. Aug 1951. 63p graphs Mi $3.00, Ph $8.75. PB 104966

In a two-dimensional field a generalized potential theory applicable to nonadiabatic and rotational flow is developed. Three partial differential equations are first obtained determining the three variables which are: Distribution of additional temperature ϑ, velocity perturbation β, and an auxiliary function K characterizing the rotationality of the flow. With the use of this theory the action of heat sources on the flow is studied, and the heat delivery in a compressible flow at subsonic and supersonic speeds is calculated. NACA TN 2436.

K VOPROSU O STRUINOM OBETKANII BESKONECHNOI RESHETKI GAZON V PRIBLIZHENNOI POST-

ANOVKE S. A. CHAPLYGINA (ON THE PROBLEM OF GAS FLOW OVER AN INFINITE CASCADE USING CHAPLYGIN'S APPROXIMATION), by G. A. Bugaenko. May 1951. 16p diagrs Mi $1.75, Ph $2.50. PB 103904

The steady flow of a compressible fluid past two-dimensional infinite cascades is obtained by using the Chaplygin's simplified pressure-density relation. Translation from Prikladnaya matematika i mekhanika, vol. XIII, no. 4, 1949 p. 449-456. NACA TM 1298.

LIFT AND MOMENT CHANGES DUE TO THE FUSELAGE FOR A YAWED AIRPLANE WITH UNSWEPT AND SWEPT WINGS, by Willi Jacobs. Flygtekniska Försöksanstalten (FFA) Stockholm. 1950. 51p diagrs, graphs Mi $2.75, Ph $7.50. PB 104039

1. Wings - Lift - Sweden 2. Fuselages - Aerodynamics - Sweden 3. Rolling moments - Sweden 4. FFA no. 34.

METHOD FOR THE CONTINUOUS VARIATION OF THE MACH NUMBER IN A SUPERSONIC WIND TUNNEL AND SOME EXPERIMENTAL RESULTS OBTAINED AT LOW SUPERSONIC SPEEDS, by G. Drougge. Flygtekniska Försöksanstalten (FFA) Stockholm. 1949. 14p photos, drawing, graphs Mi $1.75, Ph $2.50. PB 104034

A method for continous variation of the Mach number in the test section of a supersonic wind tunnel is developed. The method used made it also possible to obtain rather low supersonic Mach numbers. The investigation consists of measurements in the flow field behind a movable wedge situated in the test section of an intermittent supersonic wind tunnel. With a small conical tip in the test section Mach numbers from 1.45 down to about 1.04 were obtained. For a two-dimensional eight percent thick double circular arc wing model the drag and lift coefficients were determined for Mach numbers between 1.44 and 1.12 Schlieren pictures of this model were also taken. The results obtained are compared with other available experimental results and show in general good agreement. FFA no. 29.

METHOD OF DETERMINING INITIAL TANGENTS OF CONTOURS OF FLOW VARIABLES BEHIND A CURVED, AXIALLY SYMMETRIC SHOCK WAVE, by George P. Wood and Paul B. Gooderum. U. S. National Advisory Committee for Aeronautics. Jul 1941. 44p photo, diagrs, graphs Mi $2.50, Ph $6.25. PB 104537

A general method for calculating the initial tangents of contours of constant density, pressure, and Mach number behind a curved, axially symmetric shock wave has been derived. Initial tangents of density contours are obtained that fair well into contours determined from interferograms for the flow about a sphere at Mach number 1.62. Streamlines and contours of constant Mach number throughout this flow field have also been deduced from contours of constant density obtained by interferometry. The flow field obtained from the shock wave by the method of characteristics is compared with that obtained by interferometry. NACA TN 2411.

ON A SOLUTION OF THE NONLINEAR DIFFERENTIAL EQUATION FOR TRANSONIC FLOW PAST A WAVE-SHAPED WALL, by Carl Kaplan. U. S. National Advisory Committee for Aeronautics. Jun 1951. 32p Mi $2.25, Ph $5.00. PB 103949

The simplified nonlinear differential equation for transonic flow past a wavy wall is solved by the method of integration in series. The solution has been carried to the point where the question of the existence or non-existence of a mixed potential flow can be answered by the behavior of a single power series in the transonic similarity parameter. The calculation of the coefficients of this dominant power series has been reduced to a routine computing problem by means of recursion formulas resulting from the solution of the differential equation and the boundary condition at the surface of the wavy wall. NACA TN 2383.

OPTICAL METHODS INVOLVING LIGHT SCATTERING FOR MEASURING SIZE AND CONCENTRATION OF CONDENSATION PARTICLES IN SUPERCOOLED HYPERSONIC FLOW, by Enoch J. Durbin. U. S. National Advisory Committee for Aeronautics. Aug 1951. 28p photos, diagrs, tables Mi $2.00, Ph $3.75. PB 104968

Optical methods involving light scattering for measuring the size and concentration of condensation particles in supercooled hypersonic air flow are discussed. For verification of these methods, radii of ammonium-chloride particles were determined, and a comparison of these results with other measurements gave good agreement. By using these methods the size and concentration of condensation particles in supercooled hypersonic air flow were measured. A table of angular-light-intensity-distribution functions is given for use in measuring small particles having an index of refraction of 1.20, the index of refraction of oxygen and nitrogen. NACA TN 2441.

PRELIMINARY STUDY OF STABILITY OF FLOW FROM TWO DUCTS DISCHARGING INTO A COMMON DUCT, by Albert I. Bellin, D. Richard Messina and Paul B. Richards. U. S. National Advisory Committee for Aeronautics. Jul 1951. 33p photos, diagrs, graphs Mi $2.25, Ph $5.00. PB 104649

The instability of flow from two ducts that join into a common duct and the influence of the various parameters upon the phenomenon were investigated. A two-dimensional potential analysis was carried out under the assumption that the two duct discharge into a region of constant pressure. A unique solution exists if a Joukowski hypothesis is imposed; also, the flow is stable with respect to small changes in the physical parameters. This was confirmed by experiments with a two-dimensional water table. The problem was reconsidered with the assumption of mixing between the jet from the two ducts and the surrounding fluid in the common duct to explain the oscillations and asymmetries of flow for actual symmetric duct configurations. NACA TN 2417.

SHOCK TUBES FOR HYPERSONIC FLOW, by A. Hertzberg. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. May 1951. 13p photos, graphs (1 fold) Mi $1.75, Ph $2.50. PB 104714

Theoretical studies of the motion of strong shock waves in tubes of varying area show that steady hypersonic flows can be created in a region behind the normal shock. In order to verify the results of these studies and to determine the feasibility of utilizing this phenomenon, a small shock tube with an expanding test section was constructed and a series of exploratory tests were carried out. Preliminary schieren photographs of wave patterns observed in a

not to exceed some specified amount, the results given in this report suggest that of available cover materials, fabric provides the lightest structure. The results also suggest that closely spaced ribs, or ribs and intermediate chordwise stringers, constitute a more efficient method of reinforcing the cover than ribs and stringers. At the end of the report a comparison is made between the theoretical estimates of Part I and the experimental results of Part II. Cover date is 1951. S. O. Code no. 23-2478. ARC RM 2478.

EFFECT OF AN AUTOPILOT SENSITIVE TO YAWING VELOCITY ON THE LATERAL STABILITY OF A TYPICAL HIGH-SPEED AIRPLANE, by Ordway B. Gates, Jr. and Leonard Sternfield. U. S. National Advisory Committee for Aeronautics. Sep 1951. 29p diagr, graphs, tables Mi $2.00, Ph $3.75. PB 104992

Calculations have been made to determine the effect of an autopilot sensitive to yawing velocity on the lateral stability of a fighter airplane designed for transonic or supersonic speeds. The effects of inclination of the gyro reference axis and of time lag in the autopilot are discussed. Airplane motions in sideslip subsequent to a disturbance in sideslip are also presented for several representative flight conditions. NACA TN 2470.

FH-1 ELEVATOR INVESTIGATIONS, by C. James. Cornell Aeronautical Laboratory, Buffalo, N. Y. Jun 1951. 37p drawings, diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104959

1. FH-1 (Elevator control system) 2. Elevators, Aircraft - Controls.

FRM no. 122.

FLIGHT BY PERISCOPE. I: PERFORMING AN INSTRUMENT FLIGHT PATTERN; THE INFLUENCE OF SCREEN SIZE AND IMAGE MAGNIFICATION, by Stanley N. Roscoe. Illinois. University. Institute of Aviation, Urbana, Ill. Mar 1951. 46p photos, diagr, graphs, tables Available from University of Illinois Institute of Aviation, Urbana, Ill. PB 104577

1. Periscopes, Aircraft 2. Flying, Instrument 3. Screens, Projection.

Aeronautics bulletin no. 9. University of Illinois bulletin v. 48, no. 55. Contract N6ori-71, T. O. XVI.

INSTALLATION OF THE SOLAR PILOT DIRECTOR IN THE LINK CELESTIAL NAVIGATION TRAINER, by J. W. Whelan. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Nov 1950. 15p drawings (1 fold) Mi $1.75, Ph $2.50. PB 104441

1. Galvanometers - Controls - Canada 2. Driftmeters - Canada 3. Fuselages - Design - Canada 4. Photography, Aerial - Equipment - Canada 5. B3 (Driftmeter) 6. Link trainers - Instruments - Canada 7. RCAF EPE 953.

Cover date is February 1951. RCAF development report: Final D24-7/50. Reference: AMTS Directive 2-50 dated 31st January 1950. Issued by AMTS.

SOME WIND-TUNNEL DEVELOPMENTS OF THE SPOILER AS A FORM OF LATERAL CONTROL, by W. S. Coleman and G. H. Tidbury. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1942. 20p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 104331

1. Spoilers - Effect on aileron control 2. Spoilers - Wind tunnel tests - Gt. Brit. 3. Spoilers, Circular arc - Hinge moments - Gt. Brit. 4. Control surfaces, Lateral - Wind tunnel tests - Gt. Brit. 5. ARC RM 2586.

Cover date is 1951. S, O. Code no. 23-2586.

TESTS ON THE EFFECT OF INCIDENCE ON SOME PRESSURE HEADS AT HIGH SUBSONIC SPEEDS, by E.W.E. Rogers and C. J. Berry. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1950. 13p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104011

1. Pitot tubes - Wind tunnel tests - Gt. Brit. 2. Pitot-static tubes - Wind tunnel tests - Gt. Brit. 3. Wind tunnel tests - Gt. Brit. 4. Venturi-shrouded pitot (Tube) 5. MK VIIIA (Pitot-static head) 6. MK VIIIB (Pitot-static head) 7. VIIIA (Pitot-static head) 8. VIIIB (Pitot-static head) 9. Gt. Brit. National Physical Laboratory. Aerodynamics Division 10. ARC CP 41.

Cover date is 1951. S. O. Code no. 23-9006-41.

THEORETICAL STUDY OF SOME METHODS FOR INCREASING THE SMOOTHNESS OF FLIGHT THROUGH ROUGH AIR, by William H. Phillips and Christopher C. Kraft, Jr. U. S. National Advisory Committee for Aeronautics. Jul 1951. 98p Mi $4.25, Ph $12.50. PB 104639

An analysis has been made of the response to gusts and the stability and control characteristics of an airplane equipped with various devices to reduce accelerations due to rough air. Various methods of control are considered but the main emphasis is placed on systems in which flaps on the wing are operated through an automatic control device sensitive to angle of attack or acceleration. The flap characteristics required to give satisfactory results are derived. Examples are presented showing the effectiveness of various systems for reducing the accelerations due to gusts. NACA TN 2416.

Engines and Propellers

ANALYSIS OF THRUST AUGMENTATION OF TURBOJET ENGINES BY WATER INJECTION AT COMPRESSOR INLET INCLUDING CHARTS FOR CALCULATING COMPRESSION PROCESSES WITH WATER INJECTION, by E. Clinton Wilcox and Arthur M. Trout. U. S. National Advisory Committee for Aeronautics. 1951. 23p graphs Available from Superintendent of Documents, Government Printing Office, Washington 25, D. C. $.25. PB 104748

A psychrometric chart having total pressure (sum of partial pressures of air and water vapor) as a variable, a Mollier diagram for air saturated with water vapor, and charts showing the thermodynamic properties of various air-water vapor and exhaust gas-water vapor mixtures are presented as aids in calculating the thrust augmentation of a turbojet engine resulting from the injection of water at the compressor inlet. Curves are presented that show the theoretical performance of the augmentation method for various amounts of water injected and the effects of varying flight Mach number, altitude, ambient-air temperature, ambient relative humidity, compressor pressure ratio, and inlet-diffuser efficiency. Numerical examples, illustrating the use of the psychrometric chart and the Mollier diagram in calculating both

compressor inlet and compressor outlet conditions when water is injected at the compressor inlet, are presented. Supersedes NACA TN 2104(PB 110351) and NACA TN 2105 (PB 110431). NACA Rept. 1006.

INVESTIGATION OF TWIN FUEL SYSTEMS ON AN AIRCRAFT ENGINE, TWIN FUEL INJECTORS, by James G. McClure. Texas. Engineering Experiment Station, College Station, Tex. Jul 1951. 32p photos, diagrs, graphs Available from Texas Engineering Experiment Station, College Station, Tex. PB 104801

1. Engines, Aircraft - Fuel systems 2. Airplanes - Induction systems 3. TU EES RR27.

METHOD OF ANALYSIS FOR COMPRESSIBLE FLOW PAST ARBITRARY TURBOMACHINE BLADES ON GENERAL SURFACE OF REVOLUTION, by Chung-Hua Wu and Curtis A. Brown. U. S. National Advisory Committee for Aeronautics. Jul 1951. 42p diagrs, graphs Mi $2.50, Ph $6.25. PB 104536

A method of obtaining the flow of a nonviscous compressible fluid past compressor and turbine blades on a general surface of revolution by the use of differentiation coefficients for unequally spaced grid points is given. Solutions by the relaxation method for hand computation and the matrix method with machine computation are discussed. Detailed flow variations in a typical turbine cascade of highly cambered thick blades are obtained by this method. The variation of the fluid state across the channel is examined and the flow on the mean streamline is analyzed. The velocity distribution around the blade compares very well with experimental data. NACA TN 2407.

METHOD OF DESIGNING TURBOMACHINE BLADES WITH A DESIRABLE THICKNESS DISTRIBUTION FOR COMPRESSIBLE FLOW ALONG AN ARBITRARY STREAM FILAMENT OF REVOLUTION, by Chung-Hua Wu and Curtis A. Brown. U. S. National Advisory Committee for Aeronautics. Sep 1951. 45p diagrs, graphs Mi $2.50, Ph $6.25. PB 104975

A rapid method for designing turbomachine blades of a given turning and a desirable blade-thickness distribution for a compressible nonviscous fluid flow along an arbitrary stream filament of revolution is presented. The method is illustrated with the design of several turbine cascades of highly cambered thick blades. The determination of the shape of the blades and the compressible flow past the blades was carried out by hand computation in 16 hours. Because the surface of revolution, on which the blades are located, is completely arbitrary, the method can be applied to axial-flow, radial-flow, and mixed-flow turbomachines. The variation in the normal distance between the stream surfaces of revolution can be taken into account, thus incorporating into the design the principal effect of three-dimensional flow. The method is readily applied to the design of channels on a plane and on a general surface of revolution. NACA TN 2455.

PROPELLER BLADE ANGLE METER, by L. C. Pingel. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Aug 1950. 20p photos, fold drawings, diagr Mi $1.75, Ph $2.50. PB 104442

1. Instruments, Measuring - Propeller pitch - Canada 2. Propellers - Pitch - Measurements - Canada 3. Meters, Propeller pitch angle - Canada 4. RCAF EPE 961.

Cover date is January 1951. RCAF development report: Final D1-1. Reference: AMTS Directive number 1-48 dated 2 March, 1948. Issued by AMTS.

THRUST METHOD OF AIRCRAFT PERFORMANCE ESTIMATION, by D. A. MacLulich. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Aug 1950. 30p graphs Mi $2.00, Ph $3.75. PB 104443

The Thrust Method, as developed at the R. C. A. F. Experimental and Proving Establishment, is characterized by dealing with basic aerodynamic factors in pounds of thrust and drag and other forces. It involves the analysis of the effects of certain factors on the over-all propulsive efficiency. The method of measuring drag by gravitational force in glides is worked out so as to be effective and accurate. From an organized small set of flight tests the performance of the aircraft in the configuration used may be estimated for any height, power, speed and weight. Some considerations affecting the accuracy of estimation of performance are discussed. Cover date is Apr 1951. RCAF development report: Final D66/2. Reference: AMTS directive 18-46 dated 29th October 1946. Issued by AMTS. RCAF EPE 963.

Training and Training Devices

EVALUATION OF THE SCHOOL LINK AS AN AID IN TEACHING GROUND REFERENCE MANEUVERS, by Edward L. Brown, William G. Matheny, Ralph E. Flexman. Illinois. University. Dept. of Psychology. Dec 1950. 35p graphs, tables Mi $2.25, Ph $5.00. PB 104999

1. Link trainers 2. Pilots, Air - Training equipment 3. SDC TR 71-16-7.

SDC Human Engineering Project 20-L-1. Contract N6 ori-71, T. O. XVI, project designation NR-784-003.

HUMAN ENGINEERING FOR AN EFFECTIVE AIR-NAVIGATION AND TRAFFIC-CONTROL SYSTEM, by Paul M. Fitts. Ohio State University Research Foundation, Columbus, Ohio. Mar 1951. 104p drawings, tables Mi $4.50, Ph $13.75. PB 104669

1. Airports - Air traffic control 2. Navigation, Aerial - Training 3. Navigation, Aerial - Visual aids 4. Communication systems, Audio 5. Psychology, Applied 6. Psychology, Aviation 7. U. S. Air Navigation Development Board 8. National Research Council. Committee on Aviation Psychology.

A report prepared for the Air Navigation Development Board by the Ohio State University Research Foundation under the auspices of the NRC Committee on Aviation Psychology.

SUMMARY OF FLIGHT LOAD DATA RECORDED IN TACTICAL AND TRAINING OPERATIONS DURING THE PERIOD OF WORLD WAR II, by Lawrence B. Reynolds. U. S. Air Materiel Command. Engineering Division. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1949. 18f graphs Mi $1.75, Enl Pr $3.75. PB 104224

A total of approximately 105,000 flight hours was recorded by AMC in combat and training operations during World War II to determine flight-load data to be used in formulating structural-design criteria for future aircraft. On fighter aircraft, greater flight

loads were obtained in training than in combat operations, although on bomber aircraft no outstanding difference existed between the loads in the two types of operations. Greater flight loads were encountered in low-level bombing attacks than in high-level bombing attacks. Indications are that on the average slightly higher loads can be expected on fighter aircraft in the future.

Aerodynamics

APPLICABILITY OF THE HYPERSONIC SIMILARITY RULE TO PRESSURE DISTRIBUTIONS WHICH INCLUDE THE EFFECTS OF ROTATION FOR BODIES OF REVOLUTION AT ZERO ANGLE OF ATTACK, by Vernon J. Rossow. U. S. National Advisory Committee for Aeronautics. Jun 1951. 28p diagrs, graphs Mi $2.00, Ph $3.75. PB 104290

By comparing theoretical pressure distributions which include rotation effects, the hypersonic similarity rule is shown to be applicable to rotational as well as irrotational flow. The influence of rotation on pressure distribution was shown to be a function of the similarity parameter only, for ogive cylinders. Charts are presented for rapid determination of pressure distributions over ogive cylinders for a wide range of Mach numbers and fineness ratios. NACA TN 2399.

APPLICATIONS OF X-RAY ABSORPTION TO MEASUREMENT OF SMALL AIR-DENSITY GRADIENTS, by Ruth N. Weltmann, Steven Fairweather and Daryl Papke. U. S. National Advisory Committee for Aeronautics. Jul 1951. 36p photos, diagrs, graphs Mi $2.25, Ph $5.00. PB 104341

An analysis of two X-ray absorption methods for determining small air-density gradients is presented. One of the methods is successfully applied to the evaluation of a 6-percent density gradient of a flat-plate boundary layer of about 0.024-inch thickness in a two-dimensional channel. In the other method, divergence of the X-ray beam passing the absorber poses a problem. A solution is postulated. Example calculations of the expected sensitivity in boundary-layer density measurement are given for X-ray parameters selected for optimum operation. NACA TN 2406.

COMPARISON BETWEEN EXPERIMENTAL MEASUREMENTS AND A SUGGESTED FORMULA FOR THE VARIATION OF TURBULENT SKIN-FRICTION IN COMPRESSIBLE FLOW, by R. J. Monaghan. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1950. 24p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 104698

1. Airplanes - Skin - Friction - Gt. Brit. 2. Flow, Compressible - Measurements - Gt. Brit. 3. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 4. ARC CP 45.

Technical note no. Aero 2037. Cover date is 1951. S. O. Code no. 23-9006-45.

CONSIDERATIONS ON THE STRUCTURE OF MIXED SUBSONIC-SUPERSONIC FLOW PATTERNS (PROJECT NO. HA-219), by Dr. K. Gottfried Guderley. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1947. 94p diagrs Mi $4.25, Ph $12.50. PB 104237

This report analyzes transonic flow patterns by tracing their images in the hodograph plane. Since the mapping is subject to restrictions, this procedure reveals essential features of the physical flow patterns and thus may improve the understanding of mixed subsonic-supersonic flows. For Mach numbers close to 1, shocks in a parallel stream can also be included in these considerations. Among the questions dealt with are: the transition from a subsonic free jet to a supersonic free jet, the detachment of a shock from a wedge in supersonic flow, and the physical discussion of α-shocks. On this occasion a new type of α-shock was found. Details of the flow patterns are investigated mathematically. The numerous examples show that the transition to flow patterns of different types is continuous. Therefore conditions where the character of the flow pattern is changing need not be critical. AAF TR 2168 ND.

EVALUATION OF THE REDUCED-MASS METHOD OF REPRESENTING WING-LIFT EFFECTS IN FREE-FALL DROP TESTS OF LANDING GEARS, by Benjamin Milwitzky and Dean C. Lindquist. U. S. National Advisory Committee for Aeronautics. Jul 1951. 43p photo, diagrs, tables Mi $2.50, Ph $6.25. PB 104418

The results of reduced-mass drop tests of a small landing gear are compared with data obtained in simulated air-borne impacts and free-fall drop tests with the full weight over a range of vertical velocities. In the reduced-mass drop tests, values of load factor and ratio of strut energy to impact energy were in fairly good agreement with the data for simulated air-borne impacts, values of impact period and shock-strut effectiveness were generally low, and values of stroke and mass travel were high. In the free-fall drop tests with the full weight, the values of load factor, impact period, stroke, mass travel, and impact energy were excessive; the values of shock-strut effectiveness, however, closely approximated those obtained in the simulated air-borne impacts. NACA TN 2400.

FIRST REPORT OF THE INTERDEPARTMENTAL HELICOPTER COMMITTEE, SEPTEMBER 1950. Gt. Brit. Ministry of Civil Aviation. 1951. 30p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35. PB 103924

1. Helicopters - Aerodynamics - Gt. Brit. 2. MCA P 92.

George Cribbett, Chairman. S.O. Code no. 22-205.

HEAT DELIVERY IN A COMPRESSIBLE FLOW AND APPLICATIONS TO HOT-WIRE ANEMOMETRY, by Chan-Mou Tchen. U. S. National Advisory Committee for Aeronautics. Aug 1951. 63p graphs Mi $3.00, Ph $8.75. PB 104966

In a two-dimensional field a generalized potential theory applicable to nonadiabatic and rotational flow is developed. Three partial differential equations are first obtained determining the three variables which are: Distribution of additional temperature ϑ, velocity perturbation φ, and an auxiliary function k characterizing the rotationality of the flow. With the use of this theory the action of heat sources on the flow is studied, and the heat delivery in a compressible flow at subsonic and supersonic speeds is calculated. NACA TN 2436.

K VOPROSU O STRUINOM OBETKANII BESKONECHNOI RESHETKI GAZON V PRIBLIZHENNOI POST-

ANOVKE S. A. CHAPLYGINA (ON THE PROBLEM OF GAS FLOW OVER AN INFINITE CASCADE USING CHAPLYGIN'S APPROXIMATION), by G. A. Bugaenko. May 1951. 16p diagrs Mi $1.75, Ph $2.50. PB 103904

The steady flow of a compressible fluid past two-dimensional infinite cascades is obtained by using the Chaplygin's simplified pressure-density relation. Translation from Prikladnaya matematika i mekhanika, vol. XIII, no. 4, 1949 p. 449-456. NACA TM 1298.

LIFT AND MOMENT CHANGES DUE TO THE FUSELAGE FOR A YAWED AIRPLANE WITH UNSWEPT AND SWEPT WINGS, by Willi Jacobs. Flygtekniska Försöksanstalten (FFA) Stockholm. 1950. 51p diagrs, graphs Mi $2.75, Ph $7.50. PB 104039

1. Wings - Lift - Sweden 2. Fuselages - Aerodynamics - Sweden 3. Rolling moments - Sweden 4. FFA no. 34.

METHOD FOR THE CONTINUOUS VARIATION OF THE MACH NUMBER IN A SUPERSONIC WIND TUNNEL AND SOME EXPERIMENTAL RESULTS OBTAINED AT LOW SUPERSONIC SPEEDS, by G. Drougge. Flygtekniska Försöksanstalten (FFA) Stockholm. 1949. 14p photos, drawing, graphs Mi $1.75, Ph $2.50. PB 104034

A method for continous variation of the Mach number in the test section of a supersonic wind tunnel is developed. The method used made it also possible to obtain rather low supersonic Mach numbers. The investigation consists of measurements in the flow field behind a movable wedge situated in the test section of an intermittent supersonic wind tunnel. With a small conical tip in the test section Mach numbers from 1.45 down to about 1.04 were obtained. For a two-dimensional eight percent thick double circular arc wing model the drag and lift coefficients were determined for Mach numbers between 1.44 and 1.12 Schlieren pictures of this model were also taken. The results obtained are compared with other available experimental results and show in general good agreement. FFA no. 29.

METHOD OF DETERMINING INITIAL TANGENTS OF CONTOURS OF FLOW VARIABLES BEHIND A CURVED, AXIALLY SYMMETRIC SHOCK WAVE, by George P. Wood and Paul B. Gooderum. U. S. National Advisory Committee for Aeronautics. Jul 1941. 44p photo, diagrs, graphs Mi $2.50, Ph $6.25. PB 104537

A general method for calculating the initial tangents of contours of constant density, pressure, and Mach number behind a curved, axially symmetric shock wave has been derived. Initial tangents of density contours are obtained that fair well into contours determined from interferograms for the flow about a sphere at Mach number 1.62. Streamlines and contours of constant Mach number throughout this flow field have also been deduced from contours of constant density obtained by interferometry. The flow field obtained from the shock wave by the method of characteristics is compared with that obtained by interferometry. NACA TN 2411.

ON A SOLUTION OF THE NONLINEAR DIFFERENTIAL EQUATION FOR TRANSONIC FLOW PAST A WAVE-SHAPED WALL, by Carl Kaplan. U. S. National Advisory Committee for Aeronautics. Jun 1951. 32p Mi $2.25, Ph $5.00. PB 103949

The simplified nonlinear differential equation for transonic flow past a wavy wall is solved by the method of integration in series. The solution has been carried to the point where the question of the existence or non-existence of a mixed potential flow can be answered by the behavior of a single power series in the transonic similarity parameter. The calculation of the coefficients of this dominant power series has been reduced to a routine computing problem by means of recursion formulas resulting from the solution of the differential equation and the boundary condition at the surface of the wavy wall. NACA TN 2383.

OPTICAL METHODS INVOLVING LIGHT SCATTERING FOR MEASURING SIZE AND CONCENTRATION OF CONDENSATION PARTICLES IN SUPERCOOLED HYPERSONIC FLOW, by Enoch J. Durbin. U. S. National Advisory Committee for Aeronautics. Aug 1951. 28p photos, diagrs, tables Mi $2.00, Ph $3.75. PB 104968

Optical methods involving light scattering for measuring the size and concentration of condensation particles in supercooled hypersonic air flow are discussed. For verification of these methods, radii of ammonium-chloride particles were determined, and a comparison of these results with other measurements gave good agreement. By using these methods the size and concentration of condensation particles in supercooled hypersonic air flow were measured. A table of angular-light-intensity-distribution functions is given for use in measuring small particles having an index of refraction of 1.20, the index of refraction of oxygen and nitrogen. NACA TN 2441.

PRELIMINARY STUDY OF STABILITY OF FLOW FROM TWO DUCTS DISCHARGING INTO A COMMON DUCT, by Albert I. Bellin, D. Richard Messina and Paul B. Richards. U. S. National Advisory Committee for Aeronautics. Jul 1951. 33p photos, diagrs, graphs Mi $2.25, Ph $5.00. PB 104649

The instability of flow from two ducts that join into a common duct and the influence of the various parameters upon the phenomenon were investigated. A two-dimensional potential analysis was carried out under the assumption that the two duct discharge into a region of constant pressure. A unique solution exists if a Joukowski hypothesis is imposed; also, the flow is stable with respect to small changes in the physical parameters. This was confirmed by experiments with a two-dimensional water table. The problem was reconsidered with the assumption of mixing between the jet from the two ducts and the surrounding fluid in the common duct to explain the oscillations and asymmetries of flow for actual symmetric duct configurations. NACA TN 2417.

SHOCK TUBES FOR HYPERSONIC FLOW, by A. Hertzberg. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. May 1951. 13p photos, graphs (1 fold) Mi $1.75, Ph $2.50. PB 104714

Theoretical studies of the motion of strong shock waves in tubes of varying area show that steady hypersonic flows can be created in a region behind the normal shock. In order to verify the results of these studies and to determine the feasibility of utilizing this phenomenon, a small shock tube with an expanding test section was constructed and a series of exploratory tests were carried out. Preliminary schieren photographs of wave patterns observed in a

Mach 4 nozzle confirmed the existence of this type of flow. It thus appears possible to achieve hypersonic flows, simulating free flight conditions, in shock tubes of relatively simple design. CAL AF-702-A-1.

SIMILARITY LAW FOR HYPERSONIC FLOW ABOUT SLENDER THREE-DIMENSIONAL SHAPES, by Frank M. Hamaker, Stanford E. Neice and A. J. Eggers, Jr. U. S. National Advisory Committee for Aeronautics. Aug 1951. 22p diagrs, graphs Mi $2.00, Ph $3.75. PB 104970

The similarity law for steady hypersonic flow about slender three-dimensional shapes is derived in terms of customary aerodynamic parameters. The law is employed to determine simple relations for correlating the pressures, forces and moments acting on related shapes in hypersonic flows. In the special case of inclined bodies of revolution, these expressions for the forces and moments are generalized to include some significant effects of the viscous cross force. NACA TN 2443.

THEORETICAL AERODYNAMIC CHARACTERISTICS OF BODIES IN A FREE-MOLECULE-FLOW FIELD, by Jackson R. Stalder and Vernon J. Zurick. U. S. National Advisory Committee for Aeronautics. Jul 1951. 40p diagrs Mi $2.25, Ph $5.00. PB 104650

An analytic investigation is made of the aerodynamic coefficients of a flat plate, cylinder, sphere, and cone located in a free-molecule-flow field. Calculations were made for values of molecular speed ratio (ratio of stream speed to most probable molecular speed) ranging from 0 to 20. The case of a cone is treated in detail for cones with semivertex angles varying from 2.5^{o} to 30^{o}, and for angles of attack varying from 0^{o} to 60^{o}. The majority of the calculations are performed for two types of molecular reflection, specular and diffuse. A third type of molecular reflection is hypothesized in order that free-molecule flow can be compared with high speed continuum flow. NACA TN 2423.

THEORETICAL INVESTIGATION OF SUBMERGED INLETS AT LOW SPEEDS, by Alvin H. Sacks and John R. Spreiter. U. S. National Advisory Committee for Aeronautics. Aug 1951. 45p photos, diagrs, graphs, tables Mi $2.50, Ph $7.50. PB 104797

The flow field in a submerged inlet is investigated by theoretical, wind-tunnel, and visual-flow studies. Equations are developed for the growth of the ramp-floor boundary layer for parallel, divergent, and convergent ramp walls; and a general equation is derived relating the boundary-layer pressure losses to the boundary-layer thickness. The formation of a vortex pair in the divergent-ramp inlet is discussed, and relationships are established between the vortex pressure losses and the geometry of the inlet. NACA TN 2323.

TRANSFORMATIONS OF THE HODOGRAPH FLOW EQUATION AND THE INTRODUCTION OF TWO GENERALIZED POTENTIAL FUNCTIONS, by Luigi Crocco. U. S. National Advisory Committee for Aeronautics. Aug 1951. 81p diagrs Mi $3.75, Ph $11.25. PB 104965

It is shown that the hodograph equations of motion can be written in symmetrical form. The equations are further transformed so that two new generalized potential functions that satisfy very compact equations can be introduced. All the quantities concerned with representation of the motion can then be derived from formulas independent of the gas law adopted. An approximate transonic method has also been suggested. NACA TN 2432.

UNSTEADY LAMINAR BOUNDARY-LAYER FLOW, by Franklin K. Moore. U. S. National Advisory Committee for Aeronautics. Sep 1951. 33p diagrs, tables Mi $2.25, Ph $5.00. PB 104980

Laminar compressible boundary layer over an insulated flat plate moving with a time-dependent velocity is analyzed. A group of parameters arise which, if large, provide that the classical "starting from rest" solution applies, and, if small, that the motion is quasi-steady. These parameters relate to the time required for temporal changes to diffuse through the boundary layer. Deviations from quasi-steady velocity and temperature profiles are computed. Unsteady laminar flows with pressure gradient and, probably, unsteady turbulent boundary layers are governed by similar parameters, which may be estimated in order to provide a criterion as to whether quasi-steadiness may be assumed for a given problem. The case of fluctuating velocity field passing over a flat plate is discussed from this point of view. NACA TN 2471.

Land Transportation

AUTOMOBILE SPEED ECONOMY, by Harold S. Carter. Utah. Engineering Experiment Station, Salt Lake City, Utah. Jun 1942. 31p graphs, tables Available from The Director, Utah Engineering Experiment Station, Salt Lake City, Utah. PB 103974

1. Automobiles - Cost of operation 2. UU EES B4. Bulletin no. 4.

NOISE IN MOTOR VEHICLES, by H. Buschmann. n.d. 7f drawings Mi $1.25, Enl Pr $2.50. PB 104020

1. Motor vehicles - Noise - Germany 2. Micro RTP/T2584 3. Micro NAVSHIPS 01838-46.

Translated from Taschenbuch für den auto-ingenieur, by H. Buschmann. Tables referred to are not included

Marine Transportation

BESCHREIBUNG DER KURS-STEUERUNG TYP. 127 FÜR "S" (DESCRIPTION OF THE STEERING GEAR TYPE 127 FOR S BOATS). Siemens Apparate & Maschinen G.m.b.H., Berlin. 1944. 63f photos, diagrs (Text in German) Mi $3.00, Enl Pr $10.00. PB 103841

1. 127 (Steering gear) 2. "S" boats - Steering - Equipment - Germany 3. Ships - Steering - Equipment - Germany 4. Micro NAVSHIPS S913-46. SAM D-1224.

MODEL TESTS WITH TURBULENCE PRODUCING DEVICES, by H. F. Nordström and Hans Edstrand.

Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. 1951. 99p photos, graphs, tables Mi $4.25, Ph $12.50. PB 104700

1. Flow, Turbulent - Sweden 2. Ship models - Tests - Sweden 3. Model basins - Testing equipment - Sweden 4. Turbulence - Production devices - Göteborg, Sweden. Meddelanden nr. 18.

Meddelanden nr. 18.

NEUE ERKENNTNISSE ÜBER SCHIFFSANTRIEBE (NEW KNOWLEDGE ON SHIP PROPULSION), BY GUSTAV NOWKA. TRANSLATED by F. Rizzo. Apr 1951. 49p photos, drawings, graphs Mi $2.50, Ph $6.25. PB 104715

1. Ships - Propulsion - Germany 2. NAVSHIPS T411.

PROPULSION PROBLEMS CONNECTED WITH FERRIES, by H. F. Nordström and Hans Edstrand. Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. 1951. 50p diagrs, graphs, tables Mi $2.50, Ph $6.25. PB 104699

1. Ferryboats - Propulsion - Sweden 2. Model basin tests - Sweden 3. Propellers, Marine - Tests - Sweden 4. Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. Meddelanden 17.

Meddelanden nr. 17.

SOME EXPERIMENTS WITH SELF-PROPELLED MODELS OF TWIN SCREW SHIPS: THE INFLUENCE OF LONGITUDINAL CENTRE OF BUOYANCY ON RESISTANCE AND PROPULSION, by Anders Lindblad. Chalmers University of Technology, Gothenburg, Sweden. 1951. 23p diagrs, graphs, tables Mi $2.00, Ph $3.75. PB 104708

1. Ship models - Tests - Sweden 2. Ships - Propulsion - Sweden 3. Ships - Resistance - Sweden 4. Buoyancy - Tests - Sweden 5. Chalmers University of Technology, Gothenburg, Sweden. Transactions nr. 110.

Transactions of Chalmers University of Technology nr. 110.

SOME TESTS WITH MODELS OF SMALL VESSELS, by H. F. Nordström. Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. 1951. 41p graphs (1 fold), tables Mi $2.50, Ph $6.25. PB 104701

1. Ship models - Tests - Sweden 2. Model basin tests - Sweden 3. Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. Meddelanden 19.

Meddelanden nr. 19. Translation and revision of a paper published in 1936 in Teknisk Tidskrift, Skeppsbyggnadskonst.

STUDY OF THE ATTACHMENT OF WIRE STAYS TO WOODEN SPARS IN YACHTS OR COMMERCIAL VESSELS, by Edson Irwin Schock. Rhode Island. Engineering Experiment Station, Kingston, R. I. Sep 1949, 40p photos, drawings, graphs, tables Available from Director, Rhode Island State College. Engineering Experiment Station, Kingston, R. I. PB 104059

1. Tangs 2. Rigging, Ship 3. Spars, Wooden 4. RI EES B2.

MISCELLANEOUS

ADJUSTABLE LITTER BRACKET AND STRAP ASSEMBLY, by R. L. Summers, Howard F. Holton, and R. N. Abraham. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 20p photos, drawings Mi $1.75, Ph $2.50. PB 104671

1. Litters - Supports 2. AAF TSEAA MR 698-40B.

Exhibit 13 is report of results of test, by Urban A. Hinders.

JAPANESE ANTARCTIC WHALING EXPEDITION, 1950-51: STATISTICAL SUMMARY, by Benjamin Goldberg and Leland M. Lucas. Supreme Commander for the Allied Powers. Natural Resources Section. Jul 1951. 51p graphs, tables Mi $2.75, Ph $7.50. PB 104727

1. Whaling - Japan 2. Antarctic regions - Whaling - Japan 3. Fishing industry - Statistics - Japan 4. SCAP NRS PS 62.

PROGRAM FOR JAPANESE COASTAL FISHERIES, by William C. Herrington. Supreme Commander for the Allied Powers. Natural Resources Section. May 1951. 74p graphs Mi $3.50, Ph $10.00. PB 104000

1. Fisheries - Japan 2. SCAP NRS PS 48.

Accompained by appendices: Appx. A. Discussion group. - Appx. B. Overfishing in the coastal fisheries and proposals for its control, by Harry W. Yoe. - Appx. C. Research and conservation program, by Willis H. Rich. - Appx. D. Some methods of fishery management and their usefulness in a management program, by William C. Herrington. - Appx. E. - Enforcement of regulations, by Richard S. Croker. Appx. F. Technological developments which will increase fishermens' profits, by Claude M. Adams. - Appx. G. Improvement of management and services of Japanese fisheries cooperative, by Freeman P. Smith. Appx. H. Japanese fisheries financing and cooperative management, by Howard H. Gordon. - Appx. I. Japanese fisheries extension service program, by Freeman P. Smith. - Appx. J. Financing the Japanese fishing industry, by William C. Herrington.

PROCEEDINGS OF THE THIRD ANNUAL SURVEYING AND MAPPING CONFERENCE, NOV 15 AND 16, 1950. Florida. Engineering and Industrial Experiment Station, Gainesville, Fla. Jun 1951. 33p diagrs Available from The Director, Florida Engineering and Industrial Experiment Station, Gainesville, Fla. PB 104661

1. Land surveys - Florida 2. Mapping - Florida 3. FEES B44.

Engineering progress at the University of Florida, vol. V, no. 6.

QUALIFICATION TEST OF TYPE A-6 LOW PRESSURE STEEL, OXYGEN CYLINDER, by Courtney A. Metzger. U. S. Air Development Force. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 3p Mi $1.25, Ph $1.25. PB 104062

1. Cylinders, Oxygen - Steel - Tests 2. A-6 (Low pressure oxygen cylinder) 3. M46-100 (Oxygen cylinder part) 4. M50-100 (Oxygen cylinder part) 5. D. K. Manufacturing Co., Chicago, Ill. 6. AAF TSEAA MR 660-128-V-1.

DCRDE-660-128-V-1.

RAFT, PNEUMATIC TYPE A-3B: QUALIFICATION TEST SAMPLE, by Wayne B. Yarcho. U. S. Air Development Force. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Foce Base, Dayton,

Ohio. May 1951. 5p Mi $1.25, Ph $1.25. PB 104063

1. Rafts, Life - Pneumatic - Tests 2. Rafts, Life - Pneumatic - Materials 3. Rafts, Life - Pneumatic - Loops, Webbing 4. Rafts, Life - Pneumatic - Handles 5. Fasteners, Snap - Specifications 6. A-3B (Pneumatic life raft) 7. General Tire and Rubber Co., Akron, Ohio 8. AAF TSEAA MR 670-1DD 9. AAF TSEAA MR T51-129.

Includes: Multiplace life raft components, by B. McWhirter. p. 4-5 (Memorandum Report no. DCRTT-T51-129). This report is illegible.

RAPID METHOD FOR DETERMINING THE MOISTURE CONTENT OF SOILS, BY ALBERT JAMES BONAR, WITH ADDITIONAL DATA BY SPENCER J. BUCHANAN BASED ON ONE YEAR'S USE. Texas Engineering Experiment Station, College Station, Texas. Sep 1949. 28p photos, graphs (one fold) tables Mi $2.00, Ph $3.75. Limited supply available from Texas. Engineering Experiment Station, College Station, Texas. PB 103878

1. Soils - Moisture content 2. TU EES RR no. 9.

RECONNAISSANCE SOIL SURVEY OF JAPAN: NAGOYA AREA, by Ellis J. Kohler. Supreme Commander for the Allied Powers. Natural Resources Section. Apr 1951. 111p maps (10 fold col.), tables Mi $4.75, Ph $15.00. PB 103892

1. Soils - Surveys - Japan 2. SCAP NRS 110-F.

Color in maps will not reproduce.

RECONNAISSANCE SOIL SURVEY OF JAPAN: NORTHERN HONSHU AREA, by Harry C. Mortlock. Supreme Commander for the Allied Powers. Natural Resources Section. Jun 1951. 112p maps (part fold, col.), graph, tables Mi $4.75, Ph $15.00. PB 104628

1. Soils - Surveys - Japan 2. SCAP NRS 110-G.

REPORT FOR THE YEAR 1949-1950. Gt. Brit. Dept. of Scientific and Industrial Research. 1951. 212p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 104012

1. Scientific research - Gt. Brit. 2. Industrial research - Gt. Brit.

Cmd. 8169.

SCIENCE AND TECHNOLOGY IN JAPAN: LIST OF SCIENTIFIC AND TECHNICAL JOURNALS CURRENTLY PUBLISHED IN JAPAN. Supreme Commander for the Allied Powers. Economic and Scientific Section. Scientific and Technical Division. Apr 1950. 186p Mi $6.75, Ph $23.75. PB 104728

1. Scientific research - Periodicals - Japan 2. Science - Periodicals - Japan 3. Technical research - Periodicals - Japan 4. SCAP EES R 22.

SIEMENS ZEITSCHRIFT BD. 23, NR. 1-3. Siemens & Halske A. G., Berlin. Jan-Sep 1943. 89f photos, diagrs, graphs, tables (Text in German) Mi $3.75, Enl Pr $12.50. PB 104787

1. Hydroelectric plants - Rio Negro, Uruguay 2. Fire alarms - Germany 3. Powders, Molding - Germany 4. Switch gear - Germany 5. Cores, Permalloy - Testing equipment - Germany 6. Detectors, Magnetic crack - Germany 7. Interference, Electrical - Elimination - Germany 8. Power plants, Steam - Electrical equipment - Germany 9. Micro BIOS FD 832/49, Frames 1-86.

English abstract included. Abstract available as PB 104787s. 2p. Mi $1.25, Ph $1.25. Contents: Details of the Rio Negro (Uruguay) hydro-electric power station, by M. Enzweiler and O. Herrler. - New principles in the design of fire alarm installations, by H. Bocker. - Behavior of moulding powders based on phenolic resin/wood flour in humid/hot tropical climatic conditions, by H. Gerland. - Development in Germany of open-air switch gear installation, by K. Bader. - "AL Messplatz" permeability testing apparatus for carrier cores, by M. Bidlungmaier. - Magnetic crack detector for the examination of working materials, by Martin Berndt. - New types of series terminals, by W. Finnmann. - Recent progress in the elimination of wireless interference, by H. Bette. - Selection of the most suitable electrical equipment for individual requirements in steam power plants, by M. O. Fieguth.

SURVEY OF PRODUCTIVITY FACTORS IN FOUR SOUTHERN STATES, by Richard F. Bruckart and William J. Crum. Texas. Engineering Experiment Station, College Station, Texas. Mar 1951. 31p graphs tables Available from Texas Engineering Experiment Station, College Station, Tex. PB 103923

The study was conducted to provide data which would enable a business man to compare productivity statistics of his company with averages for the industry as a whole. Such information enables him to make improvements which strengthen the entire industry. It was not the purpose of the study to emphasize the reason for high or low productivity between states. Compiled from answers to questionnaires sent to companies in Arkansas, Louisiana, Cklahoma and Texas. TU EES RR 24.

SURVEY OF THE NEW MANUFACTURING INDUSTRIES IN KANSAS 1940-1949, by Calvin G. Logerman. Kansas. Engineering Experiment Station, Manhattan, Kansas. Sep 1950. 53p maps, diagrs, graph, tables Available from Kansas State College, Engineering Experiment Station, Manhattan, Kansas. PB 104087

1. Industries - Kansas 2. Industrial production - Statistics - Kansas 3. KEES B64.

Kansas State College Bulletin vol. 34, no. 14.

SUSTENANCE KIT, HOT CLIMATE, SEAT STYLE, INDIVIDUAL, by Norman K. Hanselman. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1951. 11p photos Mi $1.75, Ph $2.50. PB 103549

1. Kits, Aircraft - Survival 2. AAF TSEAA MR 670-20J.

TECHNISCHE BESCHREIBUNG EINES TIEFKÜHLGERÄTES FÜR -50°C UND EINES KÜHLSCHRANKES FÜR HEER UND LUFTFAHRT (DESCRIPTION OF A LOW TEMPERATURE REFRIGERATOR FOR -50°C, AND OF A COMPACT REFRIGERATOR FOR ARMY AND AIR FORCE USE). Siemens-Schuckert Werke A. G., Berlin. 1946. 24f photos, drawings (Text in German and English) Mi $2.00, Enl Pr $5.00. PB 103816

1. Blood - Preservation - Germany 2. Refrigerators, Field - Germany 3. Refrigeration - Equipment - Germany 4. Micro BIOS FD 1052/50, Frames 1-22.

English abstract included. Abstract available as PB 103816s. 1p. Mi $1.25, Ph $1.25. Some drawings will not reproduce well. Does not include all drawings mentioned in report.